This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE MEDICAL LIBRARY STANFORD
C441 .S56 1922 STOR
Dyes classified by intermediates : dyes
24503386824

LANE

MEDICAL LIBRARY

SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
1885

LEVI COOPER LANE FUND

LANE

MEDICAL LIBRARY

SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
SEMPER VIRENS
1885

LEVI COOPER LANE FUND

DYES CLASSIFIED BY INTERMEDIATES

Dyes tabularly arranged under each intermediate, with statistical and other data for both dyes and intermediates. Glossary of Dye and Intermediate names alphabetically arranged.

BY

R. NORRIS SHREVE
Consulting Chemist

IN COLLABORATION WITH

WARREN N. WATSON

AND

A. R. WILLIS
Chemists, U. S. Tariff Commission

BOOK DEPARTMENT

The CHEMICAL CATALOG COMPANY, *Inc.*
ONE MADISON AVENUE, NEW YORK, U. S. A.
1922

1R

COPYRIGHT, 1922, BY
The CHEMICAL CATALOG COMPANY, *Inc.*
All Rights Reserved

**Press of
J. J. Little & Ives Company
New York, U. S. A.**

6
:2

TABLE OF CONTENTS

PAGE
PREFACE 3
ABBREVIATIONS 5
INTRODUCTION 7

PART I. INTERMEDIATES AND DYE TABLES 17

KEY TO PART I 18
INTERMEDIATES WITH DYE TABLES. THE ARRANGEMENT OF INTERMEDIATE NAMES IS ALPHABETICAL AND INCLUDES CHEMICAL AND COMMON OR TRIVIAL NAMES 19
FORMULA INDEX OF INTERMEDIATES 581

PART II. DYE NAMES 587

GLOSSARY OF DYE NAMES 589
PAGE INDEX OF SCHULTZ NUMBERS FOR DYES 625

PREFACE

Experience in the manufacture of dyes indicates that the proper viewpoint for a correct technical program is from the intermediate side. This is a direct corollary of the fact that the intermediates are the materials out of which dyes are fabricated. Furthermore, the tremendous complexity of the dye industry, the interrelationship of one dye to another or of one intermediate to another, as well as the relationship of dyes and intermediates to the whole organic chemical industry, all require that there be available tables showing the commercial dyes derived from each important intermediate. To give this is the prime object of this work.

It is believed that this book will be of service not only to manufacturers in looking for uses of any intermediate, but to research chemists and to students. Since the tables give the various outlets and the poundage imported and manufactured, the book will aid the merchant in the buying or selling of dyes and intermediates. The very complete glossary of names, both of dyes and intermediates, will help in many directions, especially as the intermediate part includes the so-called common or trivial names. This feature will be of great service in reading the older literature and patents.

The intermediate names are alphabetically arranged. Under each principal name is given the synonyms, which are also cross-indexed in their alphabetical order. A special feature is the giving of the name used by Chemical Abstracts; this, together with the listing of the principal formulas, will aid in the use of the Chemical Abstracts by the Dye Chemist.

A Formula Index to the names of the intermediates and to the pages is given following the main part of this book containing the alphabetical treatment of the intermediates. Here the formulas of the intermediates are listed in an alphabetical order as in a dictionary, except that CH comes first; and in this way a 5-atom formula may precede a 3-atom one. This is similar to the excellent formula index of the 1920 Chemical Abstracts.

After the writer had been engaged for some time in the preparation of this book, he was informed of a somewhat similar classification undertaken by Messrs. Warren N. Watson and A. R. Willis of the Tariff Commission, Washington, D.C. It was deemed fair to coöperate and to associate the two works by the mutual use of the other names as "collaborators." Messrs. Watson and Willis have published a part of their work, comprising about a third of the Schultz dyes, in the *Color Trade Journal* serially from May to September during 1921. This serial publication by Messrs. Watson and Willis and this book by the writer are separate and independent productions. The writer, however, takes this occasion to express his appreciation for advice and help to Messrs. Watson and Willis.

It is a pleasure to acknowledge help from Dr. Austin M. Patterson on the Chemical Abstracts nomenclature. Aid has also been rendered by J. R. Minevitch, M. N. Conklin and Oscar Newman. The statistical data are taken from the yearly *Census of Dyes and Coal Tar Chemicals* compiled by the U. S. Tariff Commission, and from *Artificial Dyestuffs Used in the United States* by Thomas H. Norton.

R. NORRIS SHREVE.

NEW YORK CITY
December, 1921.

ABBREVIATIONS

Dye Application Column

A	Acid dye
ACr	Acid chrome dye
B	Basic dye
CL	Color lake
D	Direct dye
MF	Color made on fiber
M	Mordant dye
S	Sulfur dye
ss	Spirit soluble dye
V	Vat dye

Statistics Column

I '14	Imports, Fiscal Year 1914 (year ending June 30, 1914)
I '20	Imports, Calendar Year 1920
M'17	Manufactured in Calendar Year 1917, 1918, 1919, or 1920
M'18	
M'19	
M'20	

Literature References

BARNETT, ANTHRACENE AND ANTHRAQUINONE

E. de Barry Barnett, Anthracene and Anthraquinone, 1921. D. Van Nostrand & Co.

BEIL.

Beilstein, Handbuch der organischen Chemie (3rd Ed.).

BER.

Berichte der Deutschen Chemischen Gesellschaft.

CAIN, INTERMEDIATE PRODUCTS

J. C. Cain, The Manufacture of Intermediate Products for Dyes, Second Edition 1919, Macmillan & Co.

FRDL.

P. Friedlaender, Fortschritte der Teerfarbenfabrikation, 1877–1916, 12 vols., Julius Springer.

GREEN, ORGANIC COLORING MATTERS
A. G. Green, A Systematic Survey of the Organic Colouring Matters, 1908 Edition, Macmillan & Co.

GEORGIEVICS AND GRANDMOUGIN, DYE CHEMISTRY
G. von Georgievics and E. Grandmougin, translated by F. A. Mason. A Textbook of Dye Chemistry, 1920. Scott Greenwood & Son.

HEUMANN, ANILINFARBEN
K. Heumann (Fourth part edited by G. Schultz), Die Anilinfarben und ihre Fabrikation, Four Parts, 1888–1906, Friedrich Viewig.

LANGE, SCHWEFELFARBSTOFFE
Otto Lange, Die Schwefelfarbstoffe, ihre Herstellung und Verwendung, 1912, Otto Spamer.

LANGE, ZWISCHENPRODUKTE
Otto Lange, Die Zwischenprodukte der Teerfarbenfabrikation, 1920, Otto Spamer.

THORPE, DIC. CHEMISTRY
Edw. Thorpe, A Dictionary of Applied Chemistry, First Edition, Longmans Green & Co.

ULLMANN, ENZY. TECH. CHEMIE
Enzyklopaedie der technischen Chemie, Edited by Dr. Fritz Ullmann, 1914. Urban & Schwarzenberg.

Miscellaneous

o	ortho
m	meta
p	para
a	alpha
β	beta
N	Nitrogen (*signifies nitrogen attachment of radical)*
C. A. nomen. . .	Chemical Abstracts nomenclature
(mols)	Molecules
Schultz Number .	Number for dye as given in Schultz, Farbstofftabellen, 1914 Edition.

INTRODUCTION

The contents of this book fall into two parts: first, an alphabetical list of intermediates with their data and dye tables, and second, an aphabetical list of dye names referring to their Schultz numbers when known, by which any dye here classified can be found in the tables by looking in the "Page Index of Schultz Numbers" at the end of the book for the appropriate pages.

Often an intermediate is known by as many as half a dozen names, and each one is listed in its alphabetical order, but the synonyms all refer to one name under which are arranged the tables and other data. Thus the book is a glossary of intermediate names. In selecting the name given at the head of the data for a certain intermediate, the writer was influenced first by considerations of clearness and then of custom and usage. For a full discussion of this important nomenclature question, reference is made to the nomenclature section of this introduction.

Following the synonyms, is given the structural formula, the empirical formula, and the molecular weight. It is the emphatic opinion of the writer that the indexing of organic compounds by their formulas is the simplest, the most universal, and the clearest. Chemical Abstracts, starting with 1920, has inserted a formula index, and it is believed that chemists can find a given intermediate quicker and more surely in Chemical Abstracts by the use of this formula index than by the ordinary subject index. The formulas given here will be an aid in this direction. Furthermore a formula index is included in this book.

Under each intermediate there is listed a short description of methods of *Formation* followed by *Literature References*. These are not exhaustive in any sense, but the aim has been to give the usual commercial preparation together with several references to the literature for any one who desires more details. The references to Lange, Zwischenprodukte, cover the German patents.

In order to give some basis for judging the extent to which a dye or an intermediate is used, the statistical data for importation and manufacture in the United States is given under *Statistics*. These data are taken from the following government reports: *Census of Dyes and Coal-Tar Chemicals*, by U. S. Tariff Commission; *Artificial Dyestuffs Used in the U. S.*, by Thomas H. Norton, and *Chemicals and Allied Products*

Used in the U. S. by E. R. Pickrell. The *Imports 1914* both under intermediates and under dyes refer to the imports for the fiscal year ending June 30, 1914. Otherwise the imports, and always the amounts manufactured, refer to the calendar year marked. It is believed that the addition of these statistical data to the tables will be of much service in pointing out forcibly the relative commercial importance of the dyes and intermediates, and will help to complete development of the dye industry in America. In considering these statistics, it must be borne in mind that since 1914 the United States has been endeavoring to fully supply her own needs, and proceeded naturally along the lines of least resistance, so that often a dye was manufactured because of its comparative simplicity, to be later superseded by a more suitable dye of more complexity. The Imports for 1914 (fiscal year ending June 30, 1914) are "normal" except that Vat Dyes were not imported as heavily that year as had been the usual case.

The statistics of import of a dye, especially for the fiscal year ending June 30, 1914, often include a number of very similar though not identical dyes. These statistics were obtained by adding together the individual dye weights as listed by Norton under a given Schultz number.

Where *I'14, M'19, Manufactured 1919*, etc., are given followed by a question mark, it indicates that the dye or intermediate was imported or manufactured for the year marked but in amounts that have not been disclosed by the U. S. Government.

When a figure is given for imports or manufactures of dyes or intermediates, this figure always refers to pounds.

The tables proper give for any intermediate all the dyes listed in Schultz, *Farbstofftabellen*, 1914 Edition, that are derived from this intermediate. This includes practically all of the important dyes except a few of the newer ones of undisclosed constitution. Thus a given dye is separately arranged under each of its intermediates. As there is named in a special column the *Other Intermediates* constituting a dye besides the one at the head of each table, the intermediate relationship is clearly stated.

The following dyes listed in Schultz, *Farbstofftabellen* (1914), are not classified, on account of lack of information as to their composition.

30	Radial Yellow G
87	Peri Wool Blue
608	Euchrysine
609	Homophosphine G
706	Cachou de Laval
707	Sulfine Brown
708	Sulfaniline Brown
744	Sulfo Black B, 2B

751 Krygene Brown RB
752 Kryogene Direct Blue GO
753 Kryogene Direct Blue B
754 Kryogene Direct Blue 3B
755 Kryogene Black BNX
756 Kryogene Black TGO
757 Sulfogene Brown G, D
863 Anthraquinone Blue Green BXO
871 Indanthrene Violet RN Extra

In very many cases, the writer has supplemented the information in Schultz, *Farbstofftabellen*, as to composition of dyes, and hence has been able to classify many dyes whose composition is indefinite in this book. In a number of instances when Schultz refers the dyes to complex intermediates, these have been split into simpler components, and the components as well as the complex parent compound have all been indexed. Also certain obvious errors in Schultz, *Farbstofftabellen*, have been corrected, as for example, where in #182, reference is made to 1-amino-4-naphthol-sulfonic acids which the patent refers to $\alpha_1:\alpha_4$-sulfonic acids (1-amino-8-naphthol-sulfonic acids) and specifically names H acid in the example given.

When the patents describing a dye list a number of intermediates, then those listed under Example I of the patent are chosen for classification unless, of course, Schultz, *Farbstofftabellen*, gives definite composition to the dye. Quite often intermediates are indexed even though not a component part of the final dye, provided they were necessary to its manufacture, e.g. benzoic acid in the manufacture of certain of the Triphenyl-methane Dyes as Diphenylamine Blue and Aniline Blue.

All possible intermediates for any given dye are not indexed, but it is hoped to extend the present classification at a later date. Previous tables resembling those given here, but along much less extensive lines, are to be found in Heumann, *Die Anilinfarben und ihre Fabrikation* IV, II, 2, pages 1943–2013, and Lefevre, *Traité des Matières Colorantes* (1896), pages 140–407.

In the column in the tables headed *Other Intermediates Used and Notes*, there is given first the intermediates other than the one at the head of the table, which compose the dye in question. Unless otherwise marked, it is to be understood that one molecule of an intermediate is used. When more than one molecule is employed, of the intermediate heading the table, then the name of this intermediate is also given in the *Other Intermediates* column followed by the number of molecules (mols) that are used in the dye.

The notes are in brackets, and are mostly self-explanatory, and refer chiefly to constituents, such as sulfur (S), sodium sulfide (Na_2S), and the like, which enter into the formation of the dye. Such steps as

Sulfonation, Bromination, and Chlorination are given, but Coupling by Diazotization and Condensation are to be understood.

Under notes is generally listed the name of a given dye if it is a step in the preparation of the dye classified in the table, but this component dye is not used as the index or heading for any of the dye classification tables, and this fact is indicated by placing the name of the component dye in a bracket.

Indigo is an exception, and the dyes based on it are tabulated thereunder as well as under the various component intermediates.

The last column in the tables classifies the dyes by their usual method of application as indicated by the following abbreviations.

A	Acid dye
ACr	Acid chrome dye
B	Basic dye
CL	Color lake
D	Direct dye
MF	Color made on fiber
M	Mordant dye
S	Sulfur dye
ss	Spirit soluble dye
V	Vat dye

A classification of this kind is not very exact in certain cases where a dye is susceptible of several different methods of application. The aim has been to give the mode of application most generally employed.

Regarding the naming of the dyes, there is used in the tables that name first given in Schultz, *Farbstofftabellen* (1914), followed by a second name in those cases where the second name is more generally used in the United States than the first Schultz name.

A glossary of the ordinary German and Swiss names, together with many of the American and English names, is given in the back of the book. It would have been very helpful to have added to this list all the current American and English marks, but in the present development stage of the American dye industry, this turned out to be impractical. The list as given includes those listed and classified by Norton in *Artificial Dyestuffs Used in U. S.*, with various corrections and a considerable number of additions. These names refer to "Schultz" numbers where known, and as the last few pages of the book give a list of the pages on which occur references to any "Schultz" number, the place of any dye of known constitution can be readily found, together with the data regarding that dye.

In the tables, the dyes are classified under the usual constitutional headings, which are here grouped in the following list:

Nitroso Dyes
Nitro Dyes
Stilbene Dyes
Pyrazolone Dyes
Monoazo Dyes
Disazo Dyes
Trisazo Dyes
Tetrakisazo Dyes
Auramines
Triphenyl-methane Dyes
Diphenyl-naphthyl-methane Dyes
Xanthone Dyes
Acridine Dyes
Quinoline Dyes
Thiobenzenyl Dyes
Indophenol
Oxazine Dyes
Thiazine Dyes
Azine Dyes
Sulfur Dyes
Anthraquinone and Allied Dyes
Indigo Group Dyes
Aniline Black Group

NOMENCLATURE

The scientific naming of intermediates has indeed been confused, and in many instances a number of names have been used for the same compound, or the same name for several different compounds. It has been the aim of this book to give the various names met with in the literature for the intermediates, and to cross-index these names in the alphabetical arrangement,—thus giving a glossary of intermediate names for all those common intermediates here considered. Furthermore the common or trivial names are listed in a very complete manner and include the trivial names for many intermediates not specially considered here. As mentioned before, there has been chosen for the principal name from among the various synonyms that name which is clear and which is sanctioned by custom. In so choosing, the tendency has been to adopt a few of the well-known trivial or common names, such as H Acid and Nevile-Winther's Acid, in place of the strictly chemical names; for the writer's experience is that dye men, whether in the research laboratory, the factory, or the office, speak of H Acid for example, and not 1-amino-8-naphthol-3: 6-disulfonic acid.

The most scientific nomenclature is that used by Chemical Abstracts of the American Chemical Society. This is fully explained in the Introduction to Decennial Index of Chemical Abstracts, as well as in the Journal of the American Chemical Society.[1]

It, however, offers the disadvantage of requiring considerable study to master its principles, which often vary from the practice of the dye industry, and furthermore there is comparatively little literature pertaining to dyes and intermediates in the years covered by Chemical Abstracts.

On the other hand, organic chemistry is now so complex that more attention must be paid to scientific naming of organic compounds, and also the amount of dye literature contained in Chemical Abstracts is increasing yearly, so that it is to the advantage of the dye chemist to familiarize himself with the procedure of Chemical Abstracts, and it cannot be too strongly recommended that every one make a study of the principles of Chemical Abstracts nomenclature as disclosed in the references given above.

This book aims to give the Chemical Abstracts name for each intermediate; and in the many cases where this name differs from the one in common use, this Chemical Abstracts name is so designated by being marked *C. A. nomen.*, as an abbreviation for Chemical Abstracts Nomenclature. If only one name is listed, it is to be understood that this is the one sanctioned by Chemical Abstracts.

Beginning with the 1920 volumes of Chemical Abstracts, a Formula Index is included, which offers the easiest way to find reference to a chemical compound or its nomenclature.

In case of many benzene derivatives, the writer has adopted the Chemical Abstracts nomenclature, as there is considerable confusion in the literature regarding these names, and as the Chemical Abstracts procedure does not vary greatly as a rule from well-recognized practice. However, in case of many of the naphthalene derivatives the Chemical Abstracts practice is so far from what is commonly used that the Chemical Abstracts names are only given as synonyms. The men responsible for Chemical Abstracts are showing a great willingness to bring their system as near to that used in practice as possible, and in all probability the near future will show closer accord.

---

[1] Patterson and Curran, J. Amer. Chem. Soc. **39**, 1623–38 (1917).

The very common use of more than one of the terms *ortho*, *meta*, and *para*, to indicate position of substituents, is very confusing and should be dropped in preference either to the procedure of Chemical Abstracts where one such term is used in connection with numbers, or to the use of numbers alone. For example, *m-nitro-p-toluidine* ($CH_3 = 1$) and *o-amino-phenol-p-sulfonic acid* should be replaced by *2-nitro-p-toluidine* ($NH_2 = 1$) and *2-amino-1-phenol-4-sulfonic acid*, the present Chemical Abstracts usage. In the former case the writer much prefers the name *1-amino-2-nitro-4-toluene*.

Chemical Abstracts uses *p-toluidine* ($NH_2 = 1$) and *p-phenylene-diamine* and the like as "index compounds" with the various substituents as modifiers, arranged in an inverted order in their indices. In this book the practice of Chemical Abstracts in this regard is followed, except for the inversion for the principal name of the intermediate. The other names are given as synonyms and cross-indexed. However, in the body of the tables, such terms as *o-amino-phenol-p-sulfonic acid* are used in a few cases because of their very common usage, and consequent quick recognition.

Treating the matter broadly, the gist of the Chemical Abstracts nomenclature practice is that the "chief function" of a compound is expressed in the main part of the name, which with "its functional ending, if any, is placed first in the index, the names of the substituents following." The numbering starts from the "chief function" and is not varied by the addition of substituents, for instance,—*2: 7-naphthalene-sulfonic acid* is an "index compound," as is likewise *1 naphthalene-sulfonic acid;* and their amino, halogen, and nitro derivatives are indexed thereunder. For instance, Laurent's Acid or what is ordinarily called *1-naphthylamine-5-sulfonic acid* is indexed by Chemical Abstracts under *1-naphthalene-sulfonic acid*, and called *5-amino-1-naphthalene-sulfonic acid*. In the decennial index, hydroxy was also considered as a substituent.

However, *naphthol-sulfonic acids* and *phenol-sulfonic acids* are now recognized by Chemical Abstracts as exceptions to their rule of assigning the chief function to acids, and of allowing only one functional ending in the index name. So that while in the decennial index these *-ol-sulfonic acids* had their numbering start with the sulfonic group, now the numbering begins with the hydroxyl. For example, *1-naphthol-4-sulfonic acid* and *1-naphthol-3: 6-disulfonic acid*. In case of *amino- nitro-*

chloro- derivatives and the like, the positions are referred to the set numbering of the index compound. Take H Acid,—this is viewed as a derivative of index compound *1-naphthol-3: 6-disulfonic acid* by Chemical Abstracts, and is named in their index as *8-amino-1-naphthol-3: 6-disulfonic acid*, or in their inverted form as *1-naphthol-3: 6-disulfonic acid, 8-amino-*.

This numbering is quite different from the ordinary numbering of *1-amino-8-naphthol-3: 6-disulfonic acid* for H Acid. The giving in this book of both nomenclatures will help in the using of Chemical Abstracts, and as a further aid in this direction the first letter of the index compound as employed in Chemical Abstracts is italicized.

The rule of Chemical Abstracts regarding arrangement of substituents, reads as follows:—"The names of substituent radicals in the name of a compound are arranged in alphabetical order." This is an excellent practice and should be universally adopted. In conformance with this, benzyl-ethyl-aniline is recommended, and not ethyl-benzyl-aniline.

In the naming of toluene derivatives, the usual custom has been to start numbering from the CH_3 group irrespective of other substituents. In Chemical Abstracts, the numbering starts from the chief function, and the order of the chief function is: "*onium compounds, acid* (carboxylic first), *acid halide, amide, imide, aldehyde, nitrile, ketone, alcohol, phenol, mercaptan, amine, imine, ether, sulfide* (and *sulfoxide* and *sulfone*)." So whenever sulfonic acid is present, the start of the numbering is with this group, except that the carboxylic group, being an acid radical, is of same order as sulfonic, and has been given precedence over the sulfonic radical. Instead of *toluidine-sulfonic acid* with the numbering based on the CH_3, Chemical Abstracts uses *amino-o-* (or *m-* or *p-*) *toluene-sulfonic acid* and starts the numbering with the sulfonic acid group. *Toluidines* start their numbering from the NH_2 group, as it has precedence over CH_3. Another divergence of the Chemical Abstracts practice from the ordinary numbering is the place of the numbers or letters in such terms as the following:

Ordinary Practice	Chemical Abstracts Practice
Naphthalene-2: 7-disulfonic Acid	2: 7-Naphthalenedisulfonic Acid
Toluene-*p*-sulfonic Acid	*p*-Toluenesulfonic Acid

The custom of using hyphens to set off radicals and substituents from each other and from the parent compound is extensively used in this book for the sake of clearness, and as an aid to the eye and the mind. No one thinks of a complex organic chemical as a whole, but as a complex of various substituents around a central body; therefore the writing of a long name like tetramethyldiaminodiphenymethane as one word is very reprehensible and should be early abandoned. Otherwise the careless practice of writing as two or more separate words the name of one chemical individual is bound to increase; already this latter practice is gaining too much headway, as can be seen by an inspection of our trade or semi-technical journals.

The rule about hyphens as used here is to insert them between all radicals, and between the radicals and the parent body, except in the case of compound radicals, such as *methylamino-* (CH_3NH-), *tetraethyl-*, *disulfonic-* and the like. *Methylamino* should not be written *methyl-amino*. While Chemical Abstracts does not employ hyphens in this broad way, yet the use of hyphens has been extended to the names otherwise following Chemical Abstracts procedure.

It is clearly recognized that the nomenclature here used is not always consistent as between the scientific and common usage. For example while *2-amino-1-phenol-4-sulfonic acid* is listed as the principal name of this intermediate, yet in the body of the tables the ordinarily used synonym *o-amino-phenol-p-sulfonic acid* is given because of its quick recognition. However, the movement to a more scientific nomenclature such as used by Chemical Abstracts should be encouraged as much as possible, and such terms as *o-amino-phenol-p-sulfonic acid* should be dropped gradually.

PART 1

INTERMEDIATES

KEY TO PART I INTERMEDIATES AND DYE TABLES

The arrangement is alphabetical not only by chemical but by trivial or common names. Many trivial names are listed for intermediates which are not further considered. Dye tables and other data accompany those intermediates which enter directly into the formation of the commonly used dyes.

Synonyms and trivial names are given for the intermediates, and these synonyms and trivial names are listed not only under the appropriate intermediate but also separately in the alphabetical arrangement.

That chemical name called for by the Chemical Abstracts nomenclature is to be found either as the principal name of each intermediate or among its synonyms. This is distinguished by being followed by the abbreviation *C. A. nomen.*, except when only one name is used for an intermediate, in which case this name is the one in common usage and is also that one sanctioned by Chemical Abstracts. In the indices of Chemical Abstracts the names are alphabetically arranged under a number of "parent compounds" which in ordinary usage are preceded by the modifying radicals. As this book follows the ordinary usage, it was thought that it would be helpful to designate the Chemical Abstracts "parent compound," which is done by italicizing the first letter of these "parent compounds" in those names following Chemical Abstracts nomenclature.

The prefixes *m*-, *o*-, *p*-, *α*-, *β*- and the like are not considered in the main alphabetical arrangement. Hence *β*-naphthol (beta-naphthol) is to be found under N.

The import statistics are not for each strictly individual dye mark, but represent a group identical to or closely resembling a given Schultz dye. These figures are arrived at by adding the total poundage of these dyes arranged by Norton under each Schultz number in his book, *Artificial Dyestuffs Used in U. S.*

Unless otherwise marked, it is to be understood that only one molecule of each intermediate is a part of a dye. Furthermore, when more than one molecule is employed of the intermediate heading a dye table, the name of this intermediate is entered under the *Other Intermediates* column followed by the number of molecules involved.

A fuller consideration of these principles is to be found in the Introduction. See also abbreviations on page 5.

INTERMEDIATES

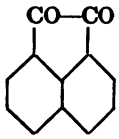
The intermediates are arranged alphabetically by their chemical names and by their trivial or common names, and they are accompanied by the dye tables and other data. See Introduction, or page 18, for explanation of this arrangement.

A Acid

1:7-Dihydroxy-naphthalene-3:6-disulfonic Acid (*not considered herein*)

Acenaphthenequinone (*C. A. nomen.*)

7:8-Diketo-acenaphthene



$= C_{12}H_6O_2 = 182$

FORMATION.—From acenaphthene by oxidation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 242

Dyes Derived from Acenaphthenequinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
907	Ciba Scarlet G	I '14:—22,265 I '20:—25,578	2-Hydroxy-thionaphthene	V
908	Ciba Red R	I '14:— 1,001	2-Hydroxy-thionaphthene [Bromination]	V
911	Ciba Orange G	I' 14:— 222	5-Amino-2-hydroxy-thionaphthene	V

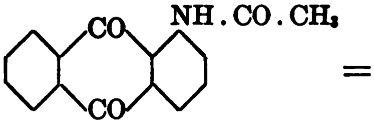
3-Acenaphthenol (*C. A. nomen.*)

See, 3-Hydroxy-acenaphthene

8-Acetamido-5-amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, Acetyl-1:4-naphthylene-diamine-6-sulfonic Acid

1-Acetamido-anthraquinone



$= C_{16}H_{11}NO_3 = 265$

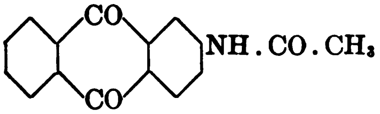
FORMATION.—From 1-amino-anthraquinone by action of acetic anhydride on solution in oleum

LITERATURE.—Lange, Zwischenprodukte, #3124

Dyes Derived from 1-Acetamido-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
813	ANTHRAQUINONE AND ALLIED DYES Indanthrene Copper R	I '14:—1,268	1:6- (*or* 1:7-) Diacetamido-anthraquinone	V

2-Acetamido-anthraquinone



$= C_{16}H_{11}NO_3 = 265$

FORMATION.—From 2-amino-anthraquinone by action of acetic anhydride on oleum solution

LITERATURE.—Lange, Zwischenprodukte, #3121

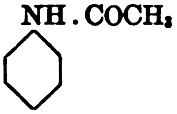
Dyes Derived from 2-Acetamido-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
812	ANTHRAQUINONE AND ALLIED DYES Indanthrene Orange R T	I '14:—2,103 I '20:— 381	1:6- (*or* 1:7-) Diacetamido-anthraquinone	V

8-Acetamido-1-naphthol-3: 6-disulfonic Acid

See, Acetyl-H Acid

Acetanilide



$= C_8H_9NO = 135$

STATISTICS.—Manufactured 1917:—1,897,703 lbs.
Manufactured 1918:—2,085,088 lbs.
Manufactured 1919:—1,934,125 lbs.
Manufactured 1920:—2,667,252 lbs.

FORMATION.—By heating aniline with glacial acetic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 52
Lange, Zwischenprodukte, #117

USES.—For preparation of *p*-nitro-acetanilide, and for *p*-nitro-aniline

Aceto-acetic Ethyl Ester

$CH_3 . CO . CH_2 . CO . OC_2H_5 = C_6H_{10}O_3 = 130$

FORMATION.—By the reaction of dry sodium ethylate and dry ethyl acetate

Dyes Derived from Aceto-acetic Ethyl Ester

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:—38,908 I '20:— 9,327	Aniline Phenyl-hydrazine-*p*-sulfonic Acid	A
22	Xylene Yellow 3 G	I '14:—23,074 I '20:—77,782	2: 5-Dichloro-phenyl-hydrazine-4-sulfonic Acid	A
25	Dianil Yellow 3 G		Primuline-sulfonic Acid	D
27	Dianil Yellow 2 R		Primuline-sulfonic Acid Phenyl-hydrazine-*p*-sulfonic Acid	D
	ANTHRAQUINONE AND ALLIED DYES			
773	Anthracene Yellow	I '14:— 4,046	Pyrogallol	M

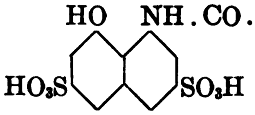
N-Acetyl-1-amino-8-naphthol-3: 6-disulfonic Acid

See, Acetyl-H Acid

Acetyl-H Acid

N-Acetyl-1-amino-8-naphthol-3:6-disulfonic Acid

8-Acetamido-1-*n*aphthol-3:6-disulfonic Acid (*C. A. nomen.*)



$=C_{12}H_{11}NO_8S_2=361$

STATISTICS.—Manufactured '20:—?

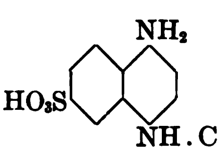
FORMATION.—From H acid by acetylation

Dyes Derived from Acetyl-H Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
42	Amido Naphthol Red G	I '14:— 3,500 M '17:— ? M '18:— ? M '19:— ? M '20:—132,637 I '20:— 2,028	Aniline	A
66	Amido Naphthol Red 6 B	I '14:— 45,697 M '18:— ? M '19:— ? M '20:—142,567 I '20:— 1,299	*p*-Amino-acetanilide	A

Acetyl-1:4-naphthylene-diamine-6-sulfonic Acid

8-Acetamido-5-amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$=C_{12}H_{12}N_2O_4S=280$

FORMATION.—From mixture of 1-naphthylamine-6-*and*-7-sulfonic acids (Cleve's Acids) by acetylation with glacial acetic acid, nitration with mixed acid, and reduction with iron.

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 152

Dyes Derived from Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid

*Schultz Number for Dye**	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
273	Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	α-Naphthylamine Schaeffer's Acid [Saponification]	D
274	Diaminogen B	I '14:—313,629 I '20:— 18,120	α-Naphthylamine Gamma Acid [Saponification]	D

Acetyl-*p*-phenylenediamine

See, *p*-Amino-acetanilide (*C. A. nomen.*)

***o*-Acid (of Claus and Voltz)**

See, Croceine Acid

1:2:4 Acid

See, 1-Amino-2-naphthol-4-sulfonic Acid

β Acid *or* **Beta Acid**

See, Anthraquinone-2-sulfonic Acid

δ Acid *or* **Delta Acid**

See, 1-Naphthylamine-4: 8-disulfonic Acid *and* 2-Naphthylamine-7-sulfonic Acid

ϵ Acid *or* **Epsilon Acid**

See, 1-Naphthol-3: 8-disulfonic Acid

See, 1-Naphthylamine-3: 8-disulfonic Acid

and 1: 8-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

ζ Acid *or* **Zeta Acid**

Naphthasultone-3-sulfonic Acid (*not considered herein*)

λ Acid *or* **Lambda Acid**

See, 1-Naphthylamine-2-sulfonic Acid

μ Acid *or* **Mu Acid**

See, 1-Naphthylamine-6-sulfonic Acid

ρ Acid *or* **Rho Acid**

See, Anthraquinone-1: 5-disulfonic Acid

χ Acid *or* **Chi Acid**

See, Anthraquinone-1: 8-disulfonic Acid

Alén's α *or* **Alén's Alpha Acid.** *(This is generally followed by the class of the compound, e.g., Alén's α Naphthylamine-disulfonic Acid)*

See, Freund's Acid (1-Naphthylamine-3: 6-disulfonic Acid)

1-Nitro-naphthalene-3: 6-disulfonic Acid (*not considered herein*)

Alén's β *or* **Alén's Beta Acid.** *(Generally followed by the class of the compound, e.g., Alén's β Naphthylamine-disulfonic Acid)*

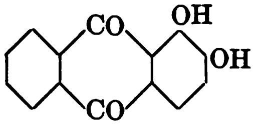
1-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-3: 7-disulfonic Acid (*not considered herein*)

Alizarin

1: 2-Dihydroxy-anthraquinone

α : β-Dihydroxy-anthraquinone



$=C_{14}H_8O_4=240$

Statistics.—See #778 in following table

Formation.—From sodium 2-anthraquinone-sulfonate by fusion with caustic oda for 2–3 days at 200° C., in autoclave, and in presence of potassium chlorate

Literature.—Schultz, Farbstofftabellen (1914 Ed.), #778

Dyes Derived from Alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
778	Alizarin	I '14:—202,392 M '17:— ? M '18:— ? M '19:— ? M '20:— ? I '20:— 8,575		M
779	Alizarin Orange	I '14:— 14,239 M '19:— ? M '20:— ? I '20:— 500	[Nitration]	M
780	Alizarin Red	I '14:— 81,919 M '17:— ? I '20:— 12,628	[Sulfonation]	M
781	Erweco Alizarin Acid Red BS		[Sulfonation]	M
783	Purpurin		[Oxidation]	M
787	Alizarin Bordeaux B	I '20:— 20	[Oxidation]	M
788	Alizarin Cyanine R	I '20:— 16,781	[Alizarin Bordeaux B, Oxidation]	M
797	Alizarin Garnet R	I '14:— 720	[1-Nitro-alizarin, Reduction]	M
798	Alizarin Maroon W	I '20:— 2,014	[Crude Nitro-alizarin, Reduction]	M
799	Alizarin Cyanine G	I '20:— 339	[Alizarin Cyanine R, Amidation]	M
854	Alizarin Viridine DG	I '20:— 11,397	[Alizarin Bordeaux B] *p*-Toluidine (2 mols) [Sulfonation]	M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	[Purpurin] Aniline [Sulfonation]	M

Alpha = *α*

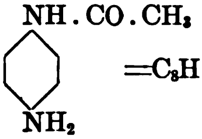
Note.—This is not considered in the alphabetical arrangement, e.g. alpha-Naphthol is indexed as α-Naphthol under "N." However β-Naphthol is placed after α-Naphthol

Alpha-Naphthol

See, α-Naphthol *under N.*

p-Amino-acetanilide (*C. A. nomen.*)

Acetyl-*p*-phenylene-diamine



$=C_8H_{10}N_2O=150$

STATISTICS.—Imported '14:—6,261 lbs.
Manufactured '17:— ?
Manufactured '18:—177,990 lbs.
Manufactured '19:— 62,567 lbs.
Manufactured '20:— 97,275 lbs.

FORMATION.—From *p*-nitro-acetanilide by reduction with iron and acetic acid at not higher than 60° C.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 89
Lange, Zwischenprodukte, #558

Dyes Derived from p-Amino-acetanilide

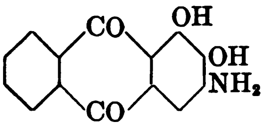
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,082 M '20:— ?	Chromotropic Acid [Saponification]	A
64	Azo Acid Red B Lanafuchsine	I '14:— 78,305 M '17:— ? M '18:— ? M '19:— 15,272 I '20:— 674 M '20:— ?	1-Naphthol-3: 6-disulfonic Acid	A
65	Azo Coralline L	M '17:— ? M '18:— ? M '19:— ? I '20:— 249 M '20:— ?	R Acid	A

Dyes Derived from *p*-Amino-acetanilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes (*continued*)			
66	Amino Naphthol Red 6B	I '14:— 45,697 M '18:— ? M '19:— ? I '20:— 1,299 M '20:—142,567	Acetyl-H Acid	A
67	Chromotrope 6B	I '14:— 2,818 M '17:— ? M '18:— ? M '19:— 77,481 M '20:— ?	Chromotropic Acid	A
	Disazo Dyes			
239	Azotol C		*m*-Phenylene-diamine [Amino-chrysoidine] *β*-Naphthol	MF
243	Coomassie Wool Black R		*α*-Naphthylamine Schaeffer's Salt	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	*α*-Naphthylamine R Salt	A
290	Violet Black		Nevile-Winther Acid *α*-Naphthylamine	D
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	Salicylic Acid (2 mols) *p*-Amino-acetanilide (2 mols) Phosgene	D
	Sulfur Dyes			
714	Thiophor Yellow Bronze G		*p*-Phenylene-diamine Benzidine [Sulfur]	S
715	Thiocatechine		[Sulfur]	S

3-Amino-alizarin (*C. A. nomen.*)

β-Amino-alizarin



$=C_{14}H_9NO_4=255$

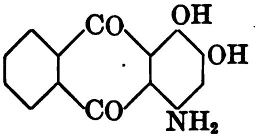
Formation.—From 3-nitro-alizarin by reduction.

Dyes Derived from 3-Amino-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
803	Alizarin Blue WX	I '14:—319,394 M '19:— ? I '20:— 5,585	3-Nitro-alizarin [Glycerol]	M
804	Alizarin Blue S	I '14:—117,850 I '20:— 43,679	3-Nitro-alizarin [Glycerol]	M
808	Alizarin Green X	I '14:—135,191 I '20:— 4,254	3-Nitro-alizarin [Glycerol; Oxidation]	M
809	Alizarin Indigo Blue S		3-Nitro-alizarin [Glycerol; Oxidation]	M

4-Amino-alizarin (*C. A. nomen.*)

α-Amino-alizarin



$=C_{14}H_9NO_4=255$

STATISTICS.—See #797 in following table

FORMATION.—From 4-nitro-alizarin by reduction with alkaline sulfides

LITERATURE.—Schultz, Farbstofftabellen (1914 Ed.), #797

Dyes Derived from 4-Amino-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
797	Alizarin Garnet R	I '14:— 720	[This is 4-Amino-alizarin]	M
805	Alizarin Green S	I '14:— 15,885	[Glycerol]	M

α-Amino-alizarin

See, 4-Amino-alizarin (*C. A. nomen.*)

β-Amino-alizarin

See, 3-Amino-alizarin (*C. A. nomen.*)

2-Amino-5-(*p*-amino-phenyl)-*benzene*-sulfonic Acid (*C. A. nomen.* *SO_3H*=1)

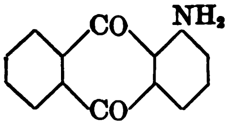
See, Benzidine-sulfonic Acid

p*-(*p*-Amino-anilino)-*phenol (*C. A. nomen.*)

See, 4-Amino-4′-hydroxy-diphenylamine

1-Amino-*anthraquinone* (*C. A. nomen.*)

α-Amino-anthraquinone



$$=C_{14}H_9NO_2=223$$

Formation.—(1) From 1-nitro-anthraquinone by reduction with sodium sulfide

(2) From anthraquinone-1-sulfonic acid (potassium salt) by heating with 10 per cent ammonia in an autoclave to 180–190°

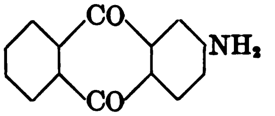
Literature.—Ullmann, Enzy. tech. Chemie. 1, 474
Lange, Zwischenprodukte, #3066, 3109, 3158

Dyes Derived from 1-Amino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
814	Algol Yellow W G	I '14:—5,185 I '20:— 4	Benzoyl chloride	V
824	Algol Orange R	I '14:— 51 I '20:— 406	2-Chloro-anthraquinone	V
826	Indanthrene Red G		2:6-Dichloro-anthraquinone 1-Amino-anthraquinone (2 mols)	
830	Indanthrene Red R	I '14:—2,099 I '20:—6,595	2:7-Dichloro-anthraquinone 1-Amino-anthraquinone (2 mols)	V
834	Algol Gray B	I '14:—4,192 I '20:— 840	1-Chloro-anthraquinone [Nitration, Reduction]	V
870	Algol Corinth R	I '20:— 134	2-Chloro-anthraquinone [Nitration, Reduction] Benzoyl chloride	V

2-Amino-anthraquinone (*C. A. nomen.*)

β-Amino-anthraquinone



$= C_{14}H_9NO_2 = 223$

STATISTICS.—Manufactured '19:—?
Manufactured '20:—?

FORMATION.—From sodium anthraquinone-2-sulfonate by heating with ammonia water in an autoclave at 200° C., preferably in the presence of an oxidizing substance

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 476
Lange, Zwischenprodukte, #3107
Cain, Intermediate Products (2d Ed.), 254

Dyes Derived from 2-Amino-anthraquinone

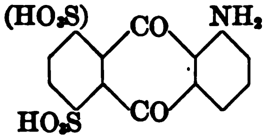
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
810	Helidone Yellow 3 G N	I '14:— 20,744 I '20:— 2,515	2-Amino-anthraquinone (2 mols) Phosgene	V
811	Algol Yellow 3G	I '14:— 1,604 I '20:— 570	2-Amino-anthraquinone (2 mols) [Succinic acid]	V
825	Algol Red B	I '14:— 2,399 I '20:— 4,151	4-Bromo-N-methyl-anthrapyridone	V
837	Indanthrene Blue R	I '14:— 500	2-Amino-anthraquinone (2 mols)	V
838	Indanthrene Blue RS	I '14:—187,379 M '17:— ? I '20:— 16,385 M '20:— ?	2-Amino-anthraquinone (2 mols) [Alkaline Reduction] [*or* Indanthrene Blue R reduced]	V
846	Indanthrene Dark Blue BT		2-Amino-anthraquinone (2 mols) [Glycerol (4 mols)] [*or* Benzanthrone-quinoline (2 mols)]	V

Dyes Derived from 2-Amino-anthraquinone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
849	Indanthrene Yellow G	I '14:— 75,192 M '19:— ? I '20:— 75,665 M '20:— ?	2-Amino-anthraquinone (2 mols)	V
867	Indanthrene Brown B	I '14:— 6,175 I '20:— 3,511	2-Amino-anthraquinone (2 mols)	V

1:5- *and* 1:8-Amino-anthraquinone-sulfonic Acids

5-*and* 8-Amino-1-*an*thraquinone-sulfonic Acids (*C. A. nomen*)



$= C_{14}H_9NO_5S = 303$

FORMATION.—Anthraquinone is sulfonated to a mixture of 1:5-and 1:8-disulfonic acids, which are then partly amidated by treatment with ammonia

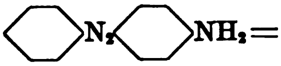
LITERATURE.—Cain, Intermediate Products (2d Ed.), 252
Ullmann, Enzy. tech. Chemie, **1**, 475
Lange, Zwischenprodukte, #3265

Dye Derived from 1:5- *and* 1:8-Amino-anthraquinone-sulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
851	Alizarin Direct Blue B	I '14:—10,201 I '20:— 2,982	[Dibromination] Aniline [Sulfonation]	A

Amino-azo-benzene

Phenyl-azo-aniline (*C. A. nomen.*)



$= C_{12}H_{11}N_3 = 197$

STATISTICS.—Imported '14:—very small
Manufactured '17:—141,888 lbs.
Manufactured '18:—171,594 lbs.
Manufactured '19:— 82,755 lbs.
Manufactured '20:—152,310 lbs.

FORMATION.—The amino-azo-benzene is prepared from aniline, by molecular rearrangement of diazo-amino-benzene, which in turn is made from aniline and diazo-benzene chloride (diazotized aniline)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 81

Dyes Derived from Amino-azo-benzene

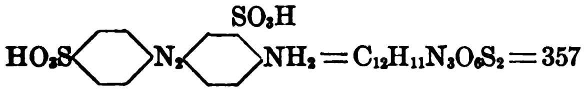
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
31	Amino-azo-benzene Spirit Yellow	M '17:— ? M '18:— 52,283 M '19:— ? M '20:— ?		ss
137	Fast Yellow Acid Yellow	I '14:— 37,378 M '17:— ? M '18:— ? I '20:— 7,848 M '20:— ?	[Oleum]	A
	DISAZO DYES			
223	Sudan III	I '14:— 2,409 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	ss MF
224	Cloth Red G	I '14:— 401 M '19:— ? M '20:— ?	Nevile-Winther Acid	A
225	Croceine AZ	I '14:— 500 '20:— 100	1-Naphthol-3: 6-disulfonic Acid	A
226	Croceine B		1-Naphthol-4: 8-disulfonic Acid	A

Dyes Derived from Amino-azo-benzene (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
227	Brilliant Croceine M	I '14:—125,137 M '17:— ? M '18:— 84,643 M '19:—157,509 I '20:— 49 M '20:—129,124	G Acid	A
228	Ponceau 5R Erythrine P	I '14:— 2,880 M '17:— ? M '19:— ?	2-Naphthol-3:6:8-trisulfonic Acid	A
229	Azo Acid Violet	I '14:— 150 I '20:— 11 M '20:— ?	1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid Phosgene	D
	Azine Dyes			
696	Indamine Blue		Aniline (excess)	B
697	Induline (Spirit Soluble)	I '14:— 25,342 M '17:— ? M '18:— 8,589 M '19:—436,201 M '20:—140,400	Aniline (excess)	ss
699	Induline (Water Soluble)	I '14:— 29,177 M '17:—183,739 M '18:— 91,724 M '19:—130,704 I '20:— 500 M '20:—168,048	Aniline (excess) [Sulfonation]	A
701	Paraphenylene Blue R		*p*-Phenylene-diamine	B

Amino-azo-benzene-disulfonic Acid

6-Amino-3:4′-azo-bisbenzene-sulfonic Acid (*C. A. nomen.*)



$HO_3S-C_6H_4-N_2-C_6H_3(SO_3H)-NH_2 = C_{12}H_{11}N_3O_6S_2 = 357$

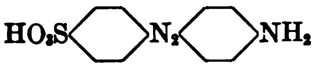
ORMATION.—From amino-azo-benzene by sulfonation with oleum

Dyes Derived from Amino-azo-benzene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
247	Double Scarlet	I '14:— 39,522	β-Naphthol	A
	Scarlet EC	M '17:— ?		
		M '18:— 74,203		
		M '19:— ?		
		M '20:— ?		
251	Croceine Scarlet O	I '20:— 100	Croceine Acid	A

Amino-azo-benzene-sulfonic Acid

p-(*p*-Amino-phenyl-azo)-*b*enzene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{11}N_3O_3S = 277$

FORMATION.—From amino-azo-benzene by sulfonation at low temperature by means of oleum

Dyes Derived from Amino-azo-benzene-sulfonic Acid

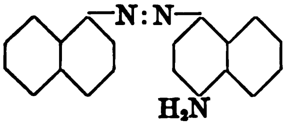
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
246	Cloth Scarlet G	I '14:— 9	β-Naphthol	A
		I '17:— ?		
		I '18:— ?		
		I '19:— ?		
		I '20:— ?		
248	Fast Scarlet B	I '14:— 1,755	Schaeffer's Acid	A
249	Croceine Scarlet 3B	I '14:— 9,613	Croceine Acid	A
250	Milling Orange	I '14:— 4,370	Salicylic Acid	M

6-Amino-3: 4′-azo-bis*b*enzene-sulfonic Acid (*C. A. nomen.*)

See, Amino-azo-benzene-disulfonic Acid

α-Amino-azo-naphthalene

4-(Naphthyl-azo)-1-*n*aphthylamine (*C. A. nomen.*)



$= C_{20}H_{15}N_3 = 297$

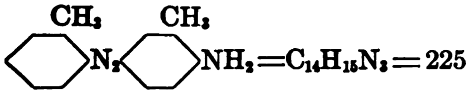
Formation.—From α-naphthylamine, this compound is prepared by mixing equal molecules of α-diazo-naphthalene chloride (from α-naphthylamine) and α-naphthylamine hydrochloride in cold aqueous solution.

Dyes Derived from α-Amino-azo-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Azine Dyes			
694	Rose Magdala	I '14:— 597	α-Naphthylamine	A
	Fast Pink for Silk			
695	Paraphenylene Violet	I '20:— 337	*p*-Phenylene-diamine	B

o-Amino-azo-toluene

p-(*o*-Tolyl-azo)-*o*-*t*oluidine (*C. A. nomen.*)



$CH_3 \quad CH_3 \quad N_2 \quad NH_2 = C_{14}H_{15}N_3 = 225$

Statistics.—Manufactured 1917:—14,355 lbs.
Manufactured 1918·— ?
Manufactured 1919:— 4,836
Manufactured 1920:— ?

Formation.—From *o*-toluidine, by molecular rearrangement of diazo-amino-toluene, which in turn is made by the reaction of equal molecules of *o*-toluidine and diazo-toluene chloride (diazotized *o*-toluidine)

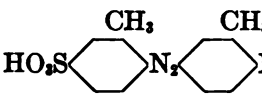
Literature.—Cain, Intermediate Products (2d Ed.), 82.

Dyes Derived from *o*-Amino-azo-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
68	Spirit Yellow R		[This is amino-azo-toluene]	ss
	Yellow Fat Color			
149	Fast Yellow R		[Oleum]	A
	Disazo Dyes			
230	Cloth Red 3 GA	I '14:— 251	Bronner's Acid	M
231	Cloth Red 3B Extra	I '14:— 15	Ethyl-2-naphthylamine-7-sulfonic Acid	M
		I '20:— 84		
232	Sudan IV	I '14:— 51	β-Naphthol	ss
		M '17:— 13,334		MF
		M '18:— 14,904		
		M '19:— ?		
		M '20:— ?		
233	Cloth Red B	I '14:— 1,962	Nevile-Winther Acid	M
		M '18:— ?		
		M '19:— ?		
		M '20:— ?		
234	Cloth Red G	I '14:— 554	Schaeffer's Acid	M
235	Croceine 3B	M '19:— ?	1-Naphthol-4: 8-disulfonic Acid	A
		M '20:— ?		
236	Cloth Red B	I '14:— 14,293	R Acid	A
	Wool Red B	M '17:— ?		
		M '18:— ?		
		M '19:— ?		
		M '20:— ?		

o-Amino-azo-toluene-sulfonic Acid

4-(4-Amino-*m*-tolyl-azo)-*m*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{15}N_3O_3S = 305$

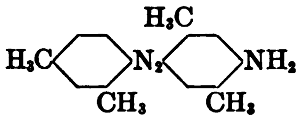
Formation.—*o*-Amino-azo-toluene is sulfonated with oleum

Dyes Derived from *o*-Amino-azo-toluene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
252	Cloth Scarlet R		β-Naphthol	M
253	Orseilline BB		Nevile-Winther's Acid	A
254	Bordeaux G		Schaeffer's Acid	A
255	Croceine Scarlet 8B Ponceau 6RB	I '14:—2,379 I '20:— 154	Croceine Acid	A

Amino-azo-xylene

4-(2: 4-Xylyl-azo)-2: 5-*x*ylidine (*C. A. nomen.*)



$= C_{16}H_{19}N_3 = 253$

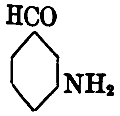
FORMATION.—From xylidine, and by action of diazo-*m*-xylidine (2: 4-xylidine) on *p*-xylidine (2: 5-xylidine)

LITERATURE.—Nölting and Forel, Ber. **18**, 2668 (1885)
Nietzki, Ber. **13**, 471 (1880)
Schultz, Chemie Steinkohlenteers **1**, 137

Dyes Derived from Amino-azo-xylene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
237	Bordeaux BX		Schaeffer's Acid	A
238	Union Fast Claret		R Acid	A

m-Amino-benzaldehyde



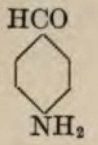
$= C_7H_7NO = 121$

FORMATION.—Benzaldehyde is nitrated, resulting in a mixture of *o*- and *m*-nitro-benzaldehyde (20 and 80 per cent). The reduction is effected and the *o*-derivative is removed by treating the crude nitration mixture with sodium hydrosulfite and hydrochloric acid, whereupon the *o*-derivative crystallizes out as the anhydro-derivative of *o*-amino-benzaldehyde. The solution contains the *m*-amino-benzaldehyde, and it is used directly

LITERATURE.—Cain, Intermediate Products (2d Ed.), 144, 145
Lange, Zwischenprodukte, #316–318

USES.—For preparation of *m*-Hydroxy-benzaldehyde

p-Amino-*b*enzaldehyde



$=C_7H_7NO=121$

FORMATION.—*p*-Nitro-toluene, in alcoholic solution, is run into a solution of sulfur in caustic soda; and the mixture is heated under a reflux condenser for 1½ hours, and then separated

LITERATURE.—Lange, Zwischenprodukte, #319–327
Ullmann, Enzy. tech. Chemie, **2**, 307

Dyes Derived from *p*-Amino-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
129	Chromazone Red A	I'14:—243	Chromotropic Acid	M
130	Chromazone Blue R		Chromotropic Acid Ethyl-phenyl-hydrazine	M

p-Amino-benzaldehyde Ethyl-phenyl-hydrazone (*C. A. nomen.*)

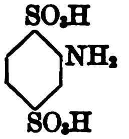
See, *p*-Amino-benzylidine-ethyl-phenyl-hydrazone

1-Amino-4-benzamido-anthraquinone (*C. A. nomen.*)

See, 1-Amino-4-benzoylamino-anthraquinone

2-Amino-*p*-benzene-disulfonic Acid (*C. A. nomen.*)

Aniline-2: 5-disulfonic Acid



$= C_6H_7NO_6S_2 = 253$

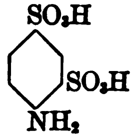
Formation.—The sodium salt of 4-chloro-3-nitro-benzene-sulfonate is boiled with sodium sulfite, resulting in formation of sodium 2-nitro-benzene-disulfonate, which is reduced with iron and acetic acid to aniline-2: 5-disulfonic acid

Literature.—Cain, Intermediate Products (2d Ed.), 49
Lange, Zwischenprodukte, #957

Uses.—For preparation of ethyl-*m*-amino-phenol

4-Amino-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

Aniline-2: 4-disulfonic Acid



$= C_6H_7NO_6S_2 = 253$

Formation.—By heating sulfanilic acid (*p*-aniline-sulfonic acid) with oleum at 170–180° C.

Literature.—Ann. **198**, 17
Beilstein, Organische Chemie (3 auf.) II, 571

Dye Derived from 4-Amino-*m*-benzene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dye			
263	Jet Black R		α-Naphthylamine Phenyl-α-naphthyl-amine	A

m-Amino-benzene-sulfonic Acid

See, Metanilic Acid

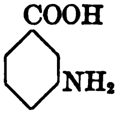
p-Amino-benzene-sulfonic Acid

See, Sulfanilic Acid

Amino-benzenyl-o-amino-thio-cresol

See, Dehydro-thio-*p*-toluidine

m-Amino-benzoic Acid



$= C_7H_7NO_2 = 137$

FORMATION.—*m*-Nitro-benzoic acid is reduced with iron and acetic acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, 2, 333

Dyes Derived from m-Amino-benzoic Acid

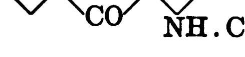
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
203	Yellow Fast-to-soap		Diphenylamine	M
204	Diamond Yellow G		Salicylic Acid	M
	TETRAKISAZO DYE			
486	Direct Brown J	I '14:—3,640	*m*-Phenylene-diamine (3 mols) *m*-Amino-benzoic Acid (2 mols)	D

o-Amino-benzoic Acid

See, Anthranilic Acid

1-Amino-4-benzoylamino-anthraquinone

1-Amino-4-benzamido-anthraquinone (*C. A. nomen.*)



$= C_{21}H_{14}N_2O_3 = 342$

FORMATION.—By heating 1:4-Diamino-anthraquinone in a toluene or nitro-benzene solution with benzoyl chloride

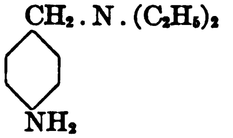
LITERATURE.—*Cf.* Ullmann, Enzy. tech. Chemie, **1**, 164

Dye Derived from 1-Amino-4-benzoylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
833	ANTHRAQUINONE AND ALLIED DYES Algol Olive R	I '14:—13,334 I '20:— 461	1-Benzoylamino-4-chloro-anthraquinone [Chloro-sulfonic Acid]	V

p-Amino-benzyl-diethylamine

p-Amino-*N*: *N*-diethyl-*benzylamine* (*C. A. nomen.*)



$$=C_{11}H_{18}N_2=178$$

FORMATION.—*p*-Nitro-benzyl chloride is treated with 2 mols of diethylamine in alcoholic solution at 100° C.; and the resulting *p*-nitro-benzyl-diethylamine is reduced with $SnCl_2$ and HCl to the *p*-amino-benzyl-diethylamine

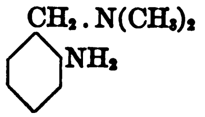
LITERATURE.—Ber. **28**, 1141
Cf. Lange, Zwischenprodukte, #255

Dye Derived from *p*-Amino-benzyl-diethylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
435	TRISAZO DYE Janus Brown B		a-Naphthylamine Resorcinol *or* *m*-phenylene-diamine [*or* Chrysoidine]	B

o-Amino-benzyl-dimethylamine

o-Amino-*N*: *N*-dimethyl-*b*enzylamine (*C. A. nomen.*)



$= C_6H_{14}N_2 = 150$

Formation.—*o*-Nitro-benzyl chloride is treated with 2 mols of dimethylamine in alcoholic solution at 100° C., and the resulting *o*-nitro-benzyl-dimethylamine is reduced with $SnCl_2$ and HCl to the *o*-amino-benzyl-dimethylamine

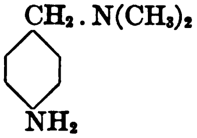
Literature.—*Cf.* Ber. **28**, 1141
Cf. Lange, Zwischenprodukte, #250, 255

Dyes Derived from *o*-Amino-benzyl-dimethylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
74	Tannin Orange	I '14:—2,202 I '20:— 349	*p*-Amino-benzyl-dimethylamine *β*-Naphthol (2 mols)	B
75	New Phosphine G	I '14:— 500	*p*-Amino-benzyl-dimethylamine Resorcinol (2 mols)	B

p-Amino-benzyl-dimethylamine

p-Amino-*N*: *N*-dimethyl-*b*enzylamine (*C. A. nomen.*)



$= C_9H_{14}N_2 = 150$

Formation.—*p*-Nitro-benzyl chloride is treated with 2 mols of dimethylamine in alcoholic solution at 100° C.; and the resulting *p*-nitro-benzyl-dimethylamine is reduced with $SnCl_2$ and HCl to the *p*-amino-benzyl-dimethylamine

Literature.—Ber. **28**, 1141
Lange, Zwischenprodukte, #255

Dyes Derived from *p*-Amino-benzyl-dimethylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
74	Tannin Orange R	I '14:—2,202 I '20:— 249	*o*-Amino-benzyl-dimethylamine *β*-Naphthol (2 mols)	B
75	New Phosphine G	I '14:— 500	*o*-Amino-benzyl-dimethylamine Resorcinol (2 mols)	B

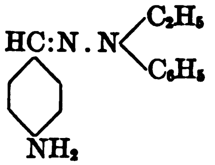
p-Amino-benzyl-ethyl-aniline-sulfonic Acid

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

p-Amino-benzylidene-ethyl-phenyl-hydrazone

Ethyl-phenyl-hydrazone *of* *p*-Amino-benzaldehyde

p-Amino-benzaldehyde Ethyl-phenyl-hydrazone (*C. A. nomen.*)



$= C_{15}H_{17}N_3 = 239$

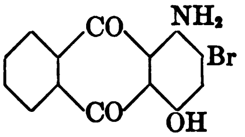
FORMATION.—By condensation of ethyl-phenyl-hydrazine and *p*-amino-benzaldehyde

Dye Derived from *p*-Amino-benzylidene-ethyl-phenyl-hydrazone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
130	Chromazone Blue R		Chromotropic Acid	M

1-Amino-2-bromo-4-hydroxy-anthraquinone

4-Amino-3-bromo-1-hydroxy-anthraquinone (*C. A nomen.*)



$=C_{14}H_8BrNO_3=318$

FORMATION.—From 1-amino-2: 4-dibromo-anthraquinone by heating with monohydrate at 100–110°

LITERATURE.—Lange, Zwischenprodukte, #3314

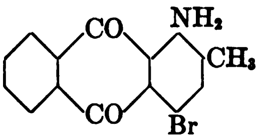
Dye Derived from 1-Amino-2-bromo-4-hydroxy-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
844	Algol Blue 3G	I '14:—9,191 I '20:—3,896	1-Amino-2-bromo-4-hydroxy-anthraquinone (2 mols)	V

4-Amino-3-bromo-1-hydroxy-anthraquinone (*C. A. nomen.*)

See, 1-Amino-2-bromo-4-hydroxy-anthraquinone

1-Amino-4-bromo-2-methyl-anthraquinone



$=C_{15}H_{10}BrNO_2=316$

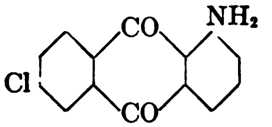
FORMATION.—2-methyl-anthraquinone (which is obtained by the condensation of toluene with phthalic anhydride) is nitrated and reduced. The resulting 1-amino-2-methyl-anthraquinone is brominated in a glacial acetic acid solution and the 1-amino-4-bromo-2-methyl-anthraquinone is formed

LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 486
Barnett, Anthracene and Anthraquinone, 80, 192, 229
Cain, Intermediate Products (2d Ed.), 260

Dyes Derived from 1-Amino-4-bromo-2-methyl-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
859	Cyananthrol R	I '14:—18,792 I '20:— 2,416	*p*-Toluidine [Sulfonation]	A
860	Cyananthrol G	I '20:— 5,127	*p*-Toluidine [Sulfonation]	A

1-Amino-6-chloro-anthraquinone



$=C_{14}H_8ClNO_2=257$

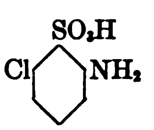
Dye Derived from 1-Amino-6-chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
827	Indanthrene Bordeaux B extra	I '14:—28,728 I '20:— 4,056	1-Amino-6-chloro-anthraquinone (2 mols) 2:7-Dichloro-anthraquinone	V

2-Amino-6-chloro-*b*enzene-sulfonic Acid (*C. A. nomen.*)

3-Chloro-aniline-2-sulfonic Acid

m-Chloro-aniline-*o*-sulfonic Acid



$=C_6H_6ClNO_3S=207.5$

FORMATION.—By the reduction of *m*-chloro-nitro-benzene-*o*-sulfonic acid in the usual way.

LITERATURE.—Beil. II, 571

Dye Derived from 2-Amino-6-chloro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
131	MONOAZO DYE Permanent Orange R		β-Naphthol	CL

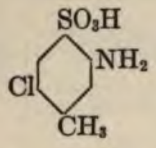
1-Amino-4-chloro-3-methyl-benzene-6-sulfonic Acid

See, 2-Amino-5-chloro-*p*-*t*oluene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

2-Amino-5-chloro-*p*-*t*oluene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

2-Chloro-5-toluidine-4-sulfonic Acid ($CH_3 = 1$)

1-Amino-4-chloro-3-methyl-benzene-6-sulfonic Acid



$= C_7H_8ClNO_3S = 221.5$

STATISTICS.—Manufactured '20:—22,753 lbs

FORMATION.—From *o*-chloro-toluene-*p*-sulfonic acid ($CH_3 = 1$) by nitration and subsequent reduction

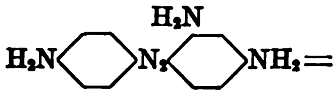
LITERATURE.—Lange, Zwischenprodukte, #1022

Dye Derived from 2-Amino-5-chloro-*p*-*t*oluene-sulfonic Acid ($SO_3H = 1$)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
153	MONOAZO DYE Lake Red C	I '14:—306,607 M '19:— ? I '20:— 4,105	β-Naphthol	CL

4-Amino-chrysoidine (*C.A. nomen.*)

2: 4: 4′-Triamino-azo-benzene



$= C_{12}H_{13}N_5 = 227$

Formation.—(1) *p*-Amino-acetanilide (acetyl-*p*-phenylene-diamine) is diazotized and combined with *m*-phenylene-diamine, and then the acetyl group removed

(2) *p*-Nitro-aniline is diazotized and combined with *m*-phenylene-diamine, and the product reduced with sodium sulfide

Literature.—Lange, Zwischenprodukte, #1765

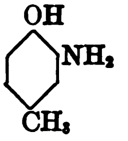
Dye Derived from 4-Amino-chrysoidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
239	Disazo Dye Azotol C		β-Naphthol	MF

2-Amino-*p*-cresol (*OH=1, C. A. nomen.*)

m-Amino-*p*-cresol (*CH₃=1*)

3-Amino-*p*-cresol (*Eng. and Germ. nomen. CH₃=1*)



$= C_7H_9NO = 123$

Formation.—(1) *p*-Cresol is nitrated and then reduced with $SnCl_2$ and HCl. (2) *p*-Toluidine is treated with nitric and nitrous acids so as to form 2-nitro-*p*-cresol (*OH=1*), which is then reduced to the amino compound

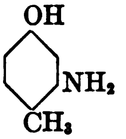
Literature.—Ber. **22**, 348; **24**, 1960
Beil. II, 752

Dye Derived from 2-Amino-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
260	DISAZO DYE Erio-Chrome Verdon	I '14:—882	Sulfanilic acid β-Naphthol	ACr

3-Amino-*p*-cresol (*Eng. and Ger. nomen.* $CH_3=1$)
See, 2-Amino-*p*-cresol (*OH = 1, C. A. nomen.*)

3-Amino-*p*-cresol (*OH = 1, C. A. nomen.*)
6-Amino-*p*-cresol ($CH_3=1$)
o-Amino-*p*-cresol ($CH_3=1$, *Ger. and English nomen.*)



$= C_7H_9NO = 123$

FORMATION.—*p*-Toluidine is nitrated, and the 3-nitro-*p*-toluidine sulfate ($NH_2=1$) therefrom is treated with $NaNO_2$ in the cold and then boiled with dilute sulfuric acid, thus forming 3-nitro-*p*-cresol, which latter on reduction with $SnCl_2$ and HCl gives 3-amino-*p*-cresol

LITERATURE.—Beil. II, 751, 753

Dye Derived from 3-Amino-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
576	XANTHONE DYE Rhodamine 3G	I '14:—19,568 I '20:— 855	Dimethylamino - hydroxy - benzoyl-benzoic acid [Ethyl esterification]	B

6-Amino-*p*-cresol ($CH_3=1$)
See 3-Amino-*p*-cresol (*OH = 1, C. A. nomen.*)

m-Amino-p-cresol (*$CH_3=1$*)

See, 2-Amino-*p*-cresol (*$OH=1$, C. A. nomen.*)

o-Amino-p-cresol (*$CH_3=1$*)

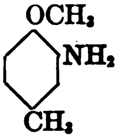
See, 3-Amino-*p*-cresol (*$OH=1$, C. A. nomen.*)

2-Amino-p-cresol Methyl Ether (*$OCH_3=1$*)

6-Methoxy-*m*-toluidine (*C. A. nomen. $NH_2=1$*)

m-Amino-*p*-cresol Methyl Ether (*$CH_3=1$*)

3-Amino-4-cresol Methyl Ether (*$CN_3=1$*)



$= C_8H_{11}NO = 137$

FORMATION.—2-Nitro-*p*-cresol (OH = 1), obtained by action of nitrous and excess nitric acids upon *p*-toluidine, is methylated and reduced

LITERATURE.—Ber. **22**, 348; **24**, 960

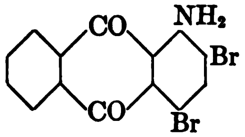
Dyes Derived from 2-Amino-p-cresol Methyl Ether (*$OCH_3=1$*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	Salicylic Acid	M
100	Eosamine B	I '14:—1,914 I '20:—1,600	1-Naphthol-3:8-disulfonic Acid	A
101	Coccinine B		R Acid	A
	TRISAZO DYES			
439	Direct Indigo Blue A	M '18:— ?	Benzidine H Acid (2 mols)	D
440	Direct Indigo Blue BK		Benzidine Gamma Acid (2 mols)	D

m-Amino-p-cresol Methyl Ether ($CH_3 = 1$)

See, 2-Amino-p-cresol Methyl Ether ($OCH_3 = 1$)

1-Amino-2:4-dibromo-anthraquinone



$= C_{14}H_7Br_2NO_2 = 381$

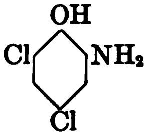
Formation.—1-Amino-anthraquinone is treated in nitro-benzene solution and at about 120–130° with an excess of bromine

Literature.—Ullmann, Enzy. tech Chemie, **1**, 475
Ger. Pat., 160,169

Dye Derived from 1-Amino-2:4-dibromo-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
855	Alizarin Pure Blue B		p-Toluidine [Sulfonation]	ACr

2-Amino-4:6-dichloro-phenol



$= C_6H_5Cl_2NO = 178$

Formation.—4:6-Dichloro-2-nitro-phenol is reduced with tin and hydrochloric acid

Literature.—Beil. II, 727

Dye Derived from 2-Amino-4:6-dichloro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
86	Azarine S		β-Naphthol	M

4-Amino-1-diethylamino-benzene-3-thiosulfonic Acid
See, Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-diethyl-aniline**
See, N: N-Diethyl-*p*-phenylene-diamine (*C A. nomen.*)

***p*-Amino-diethyl-aniline-thiosulfonic Acid**
See, Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-*N*: *N*-diethyl-*b*enzylamine** (*C. A. nomen.*)
See, p-Amino-benzyl-diethylamine

2-Amino-5-dimethylamino-*b*enzene-thiosulfonic Acid (*C. A. nomen.*)
See, Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

***m*-Amino-dimethyl-aniline**
See N: N Dimethyl-*m-p*henylene-diamine (*C. A. nomen.*)

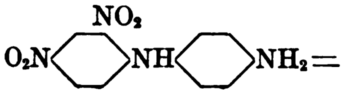
***p*-Amino-dimethyl-aniline**
See, N: N-Dimethyl-*p-p*henylene-diamine (*C. A. nomen.*)

***p*-Amino-dimethyl-aniline-thiosulfonic Acid**
See, Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

***o*-Amino-*N*: *N*-dimethyl-*b*enzylamine** (*C. A. nomen.*)
See, o-Amino-benzyl-dimethylamine

***p*-Amino-*N*: *N*-dimethyl-*b*enzylamine** (*C. A. nomen.*)
See, p-Amino-benzyl-dimethylamine

4′-Amino-2: 4-dinitro-diphenylamine
N- 2: 4-Dinitro-phenyl)-*p-p*henylene-diamine (*C. A. nomen.*)



$O_2N\langle\rangle NH\langle\rangle NH_2 = C_{12}H_{10}N_4O_4 = 274$ (with NO_2 above the first ring)

FORMATION.—1-Chloro-2:4-dinitro-benzene is condensed with *p*-phenylene-diamine

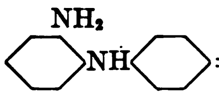
LITERATURE.—Lange, Zwischenprodukte, #1666

Dye Derived from 4′-Amino-2:4-dinitro-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
727	SULFUR DYE Auronal Black B		[Glycerol; S + Na_2S]	S

o-Amino-diphenylamine

N-Phenyl-*o*-phenylene-diamine (*C. A. nomen.*)



$= C_{12}H_{12}N_2 = 184$

FORMATION.—By reducing *o*-nitro-diphenylamine (from *o*-bromo-nitrobenzene and aniline) by heating with ammonium sulfide

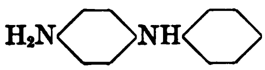
LITERATURE.—Lange, Zwischenprodukte, #1611
Chem. Zeitung, **18**, 1095
Ber. **23**, 1843

Dye Derived from *o*-Amino-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
668	AZINE DYE Flavinduline O	I '14:—660	Phenanthrene-quinone	B

p-Amino-diphenylamine

N-Phenyl-*p*-phenylene-diamine (*C. A. nomen.*)



$= C_{12}H_{12}N_2 = 184$

Formation.—This intermediate can be prepared by reducing Orange IV, by means of sodium sulfide and sulfur. The Orange IV results from the coupling of diazotized sulfanilic acid with diphenylamine

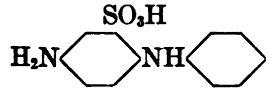
Literature.—Lange, Zwischenprodukte, #1611
Cain, Intermediate Products (2d Ed.), 74

Dyes Derived from *p*-Amino-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Azine Dye			
687	Rosolan O	I '20:—1,083	Aniline *o*-Toluidine [Oxidation]	B
	Aniline Black Group			
922	Diphenyl Black	I '14:—1,470 M '19:— ? M '20:— ?	*p*-Amino-diphenylamine (x mols) [Oxidation]	Special

p-Amino-diphenylamine-2-sulfonic Acid

2-Anilino-5-amino-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{12}N_2O_3S = 264$

Formation.—*p*-Chloro-nitro-benzene is sulfonated to 2-chloro-5-nitro-benzene-sulfonate, which latter in presence of glycerol and sodium carbonate is condensed with aniline to form *p*-nitro-diphenylamine-2-sulfonic acid. This is reduced by iron and hydrochloric acid, resulting in *p*-amino-diphenylamine-2-sulfonic acid

Literature.—Cain, Intermediate Products (2d Ed.), 75
Cf. Lange, Zwischenprodukte, #1646, 1647

Uses.—For preparation of the Nerol Dyes

α-(*p*-Amino-*N*-ethyl-anilino)-*p*-*t*oluene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

α-(4-Amino-*N*-ethyl-3-sulfomercapto-anilino)-*p*-*t*oluene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-ethyl-*o*-toluidine** (*CH_3=1*)

See, *N^3*-Ethyl-4-*m*-tolyene-diamine (*C. A. nomen. NH_2=1*)

***p*-Amino-ethyl-*o*-*t*oluidine** (*NH_2=1*)

See, *N^1*-Ethyl-*p*-tolylene-diamine

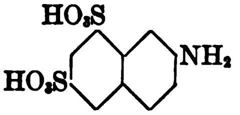
Amino-G Acid[1]

2-Naphthylamine-6:8-disulfonic Acid

7-Amino-1:3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

β-Naphthylamine-γ-disulfonic Acid

β-Naphthylamine-disulfonic Acid G



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:—894,624 lbs.

FORMATION.—From G acid, by heating the sodium salt with ammonia and sodium bisulfite solution, in an autoclave under pressure

LITERATURE.—Lange, Zwischenprodukte, #2599
Cain, Intermediate Products (2d Ed.), 209

---

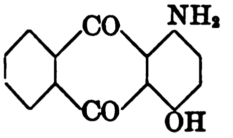
[1] Occasionally in the older literature, this 2-naphthylamine-6: 8-disulfonic Acid has been called G Acid.

Dyes Derived from Amino-G Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
178	Crumpsall Yellow		Salicylic Acid	A
	DISAZO DYES			
270	Brilliant Croceine 9B		Aniline G *and* R Acids	A
271	Diamine Blue 6G		1-Amino-2-naphthol ethyl ether β-Naphthol	D
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	α-Naphthylamine R Acid	A

1-Amino-4-hydroxy-anthraquinone

4-Amino-1-hydroxy-anthraquinone (*C. A. nomen.*)



$=C_{14}H_9NO_3=239$

FORMATION.—(1) From quinazarin by heating with ammonia. (2) From 1-amino-anthraquinone by heating with sulfuric acid (66° Be.) and boric acid to 180–200° C.

LITERATURE.—Lange, Zwischenprodukte, #3253–3255

Dye Derived from 1-Amino-4-hydroxy-anthraquinone

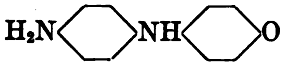
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
818	Algol Pink R	I '14:— 126 I '20:—1,368	Benzoyl chloride	V

4-Amino-1-hydroxy-anthraquinone (*C. A. nomen.*)

See, 1-Amino-4-hydroxy-anthraquinone

4-Amino-4′-hydroxy-diphenylamine

p-(*p*-Amino-anilino)-*p*henol (*C. A. nomen.*)



= $C_{12}H_{12}N_2O$ = 200

FORMATION.—From phenol and *p*-phenylene-diamine by oxidation at low temperature

LITERATURE.—Lange, Zwischenprodukte, #1639–1643

Dye Derived from 4-Amino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
732	SULFUR DYE Autogene Black	I ’14:—7,495	Phenol [S_2Cl_2; S + Na_2S]	S

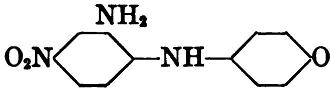
2-Amino-7-hydroxy-diphenylenazine

See, 2-Amino-8-hydroxy-phenazine

2-Amino-4′-hydroxy-4-nitro-diphenylamine

4-Nitro-2-amino-4′-hydroxy-diphenylamine

p-(2-Amino-4-nitro-anilino)-*p*henol (*C. A. nomen.*)



= $C_{12}H_{11}N_3O_3$ = 245

FORMATION.—Chloro-dinitro-benzene is condensed with *p*-amino-phenol in presence of an acetate to 2: 4-dinitro-4′-hydroxy-diphenylamine, which by partial reduction furnishes the above derivative.

LITERATURE.—Beil II, *spl.*, 399; IV, *spl.*, 397
Lange, Zwischenprodukte, #1670
Thorpe, Dic. Chemistry, **2**, 245

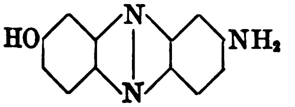
Dyes Derived from 2-Amino-4′-hydroxy-4-nitro-diphenylamine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	SULFUR DYES			
726	Pyrogene Direct Blue Pyrogene Blue	I '14:—10,934 I '20:— 2,498	[Alcohol; $S+Na_2S$]	S
730	Pyrogene Black G	I '14:— 8,725	[$S+Na_2S$; *It is not certain that the amino-hydroxy-nitro-diphenylamine referred to is the one with the positions given above*]	S
736	Thion Blue B	I '14:— 7,353 I '20:—11,855	[CS_2; $S+Na_2S$]	S

2-Amino-8-hydroxy-phenazine

2-Amino-7-hydroxy-diphenylenazine

8-Amino-2-*p*henazinol (*C. A. nomen.*)



$=C_{12}H_9N_3O=211$

FORMATION.—1-Chloro-2:4-dinitro-benzene condensed with *p*-amino-phenol, the product reduced, and the resulting diamino-hydroxy-diphenylamine oxidized in alkaline solution with manganese dioxide

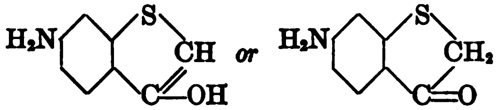
LITERATURE.—Lange, Zwischenprodukte, #1969
Cain, Intermediate Products (2d Ed.), 83

Dye Derived from 2-Amino-8-hydroxy-phenazine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	SULFUR DYE			
739	Immedial Bordeaux G Immedial Maroon B	I '14:—15,496	[$S+Na_2S$]	S

5-Amino-2-hydroxy-thionaphthene (*C. A. numbering*)

6-Amino-3-hydroxy-thionaphthene (*German numbering*)



= C_8H_7NOS = 165

Formation.—4-Acetamido-2-amino-benzoic acid is diazotized, reacted first with potassium xanthate ($C_2H_5O.CS.SK$) and then with chloro-acetic acid, forming 4-acetamido-2-thioglycolic-benzoic acid, which by melting forms the desired 5-amino-2-hydroxy-thionaphthene

Literature.—Lange, Zwischenprodukte, #2166
Ullmann, Enz. tech. Chemie, 3, 568

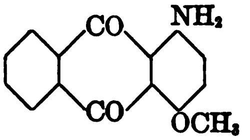
Dyes Derived from 5-Amino-2-hydroxy-thionaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Indigo Group Dyes			
902	Helindone Brown 2R	I '14:— 876 I '20:— 1,778	2-Isatin-anilide [Bromination; ? classification]	V
903	Helindone Brown 5R		2-Isatin-anilide [Bromination]	V
904	Helindone Brown G	I '14:—13,086 I '20:— 2,200	Isatin [Bromination]	V
911	Ciba Orange G	I '14:— 222	Acenaphthenequinone [Bromination]	V
914	Helindone Orange D	I '20:— 17	5-Amino-2-hydroxy-thionaphthene (2 mols) [Bromination]	V

6-Amino-3-hydroxy-thionaphthene (*German numbering*)

See, 5-Amino-2-hydroxy-thionaphthene (*C. A. numbering*)

1-Amino-4-methoxy-anthraquinone



$=C_{15}H_{11}NO_3=253$

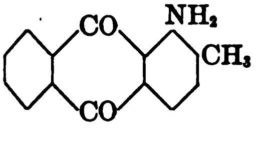
FORMATION.—Probably by the nitration and subsequent reduction of 1-methoxy-anthraquinone. The 1-methoxy-anthraquinone is obtained from 1-nitro-anthraquinone by heating with an alcoholic solution of potassium methylate with exclusion of water

LITERATURE.—*Cf.* Barnett, Anthracene and Anthraquinone, 169, 279, 280, 287

Dyes Derived from 1-Amino-4-methoxy-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
815	Algol Scarlet G	I '20:—959	Benzoyl chloride	V
829	Algol Bordeaux 3B	I '20:— 61	1-Amino-4-methoxy-anthraquinone (2 mols) 2: 6-Dichloro-anthraquinone	V

1-Amino-2-methyl-anthraquinone



$=C_{15}H_{11}NO_2=237$

FORMATION.—2-Methyl-anthraquinone is dissolved in sulfuric acid solution and nitrated with sodium nitrate. The nitro compound is then separated and reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 260
Lange, Zwischenprodukte, #3209

Dye Derived from 1-Amino-2-methyl-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
868	ANTHRAQUINONE AND ALLIED DYES Cibanone Brown B	I '14:—399	[Sulfur]	V

3-Amino-4-methyl-diphenylamine

See, N^1-Phenyl-4-*m*-tolylene-diamine

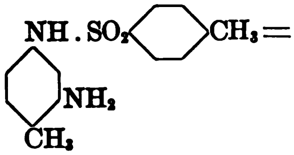
IV-Amino-5-methyl-2-phenyl-thiazol-sulfonic Acid

See, Dehydro-thio-*p*-toluidine-sulfonic Acid

***N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide**

3′-Amino-(*p*-toluene-sulfo)-*p*-toluide (*C. A. nomen.*)

(*Example of m-amino-aryl-sulfamide*)



$= C_{14}H_{16}N_2O_2S = 276$

FORMATION.—3-Nitro-*p*-toluidine ($NH_2 = 1$) is suspended in water, *p*-toluene-sulfochloride and soda added. The reaction product is purified by solution in dilute caustic soda and precipitation with hydrochloric acid. This nitro body is now reduced with zinc dust and hydrochloric acid to the amino-sulfamide

LITERATURE.—Lange, Zwischenprodukte, #1801
Schultz-Heumann, Anilinfarben, 4, 2103
Ger. Pat. 135,016

Dyes Derived from *N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
92	MONOAZO DYE Metachrome Bordeaux R		Picramic Acid	M

α-Amino-naphthalene
See, α-Naphthylamine

β-Amino-naphthalene
See, β-Naphthylamine

3-Amino-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, Amino-R Acid

4-Amino-1: 5-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4: 8-disulfonic Acid

4-Amino-1: 6-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4: 6-*and*-4: 7-disulfonic Acids

4-Amino-1: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4: 6-*and*-4: 7-disulfonic Acids

4-Amino-2:-7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, Freund's Acid

5-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-5: 7-disulfonic Acid

6-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, 2-Naphthylamine-5: 7-disulfonic Acid

7-Amino-1: 3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
See, Amino-G Acid

8-Amino-1: 6-*n*apthalene-disulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-3: 8-disulfonic Acid

1-Amino-naphthalene-4-sulfonic Acid
See, Naphthionic Acid

1-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-2-sulfonic Acid

2-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, 2-Naphthylamine-1-sulfonic Acid

4-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, Naphthionic Acid

5-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, Laurent's Acid

5-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen*)
See, 1-Naphthylamine-6-sulfonic Acid

5-*and*-8-Amino-2-*n*aphthalene-sulfonic Acids (*C. A. nomen.*)
See, 1-Naphthylamine-6-*and*-7-sulfonic Acids

6-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, Broenner's Acid

6-*and*-7-Amino-1-*n*aphthalene-sulfonic Acids (*C. A. nomen.*)
See, 2-Naphthylamine-5-*and*-8-sulfonic Acids

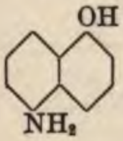
7-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, 2-Naphthylamine-7-sulfonic Acid

8-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-8-sulfonic Acid

8-Amino-1:3:5-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-4:6:8-trisulfonic Acid

8-Amino-1:3:6-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)
See, 1-Naphthylamine-3:6:8-trisulfonic Acid

5-Amino-1-*n*aphthol



$= C_{10}H_9NO = 159$

FORMATION.—From 1-amino-naphthalene-5-sulfonic acid by fusion with caustic soda at 250°

LITERATURE.—Lange, Zwischenprodukte, #2335

Dye Derived from 5-Amino-1-naphthol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
187	MONOAZO DYE Lanacyl Blue BB	I '14:—4,200	H Acid	A

Amino-naphthol δ

1-Amino-7-naphthol (*not considered herein*)

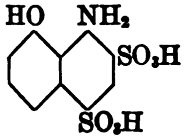
1-Amino-8-naphthol-2:4-disulfonic Acid

8-Amino-1-naphthol-5:7-disulfonic Acid (*C. A. nomen.*)

SS Acid *or* 2S Acid

Chicago Acid

Amino-naphthol-disulfonic Acid SS



$= C_{10}H_9NO_7S_2 = 319$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By caustic fusion at 180–190° of sodium 1:8-naphthasultam-2:4-disulfonate (anhydride of 1-amino-naphthalene-2:4:8-trisulfonic acid), which in turn is made from 1-naphthylamine-4:8-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 236
Lange, Zwischenprodukte, #2719
Thorpe, Dic. Chemistry, 3, 641

Dyes Derived from 1-Amino-8-naphthol-2:4-disulfonic Acid

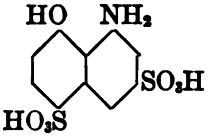
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 150	Dianisidine β-Naphthol	D
422	Chicago Blue 4B	I '14:— 8,269	Dianisidine 1- Amino-8-naphthol-4-sulfonic Acid	D
424	Chicago Blue 6B	I '14:—118,542 M '19:— ? I '20:— 7,480 M '20:— ?	Dianisidine 1-Amino-8-naphthol-2:4-disulfonic Acid (2 mols)	D

1-Amino-8-naphthol-3:5-disulfonic Acid

8-Amino-1-naphthol-4:6-disulfonic Acid (*C. A. nomen.*)

Amino-naphthol-disulfonic Acid B

B Acid


$= C_{10}H_9NO_7S_2 = 319$

FORMATION.—By sulfonation of 1-amino-8-naphthol-3-sulfonic acid

LITERATURE.—Amer. Pat. 606,437
Ger. Pat. A. F. 8626

Dyes Derived from 1-Amino-8-naphthol-3: 5-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
216	Domingo Blue Black B		Aniline *p*-Nitro-aniline	A
389	Eboli Blue B		Tolidine 1-Amino-8-naphthol-3: 5-disulfonic Acid (2 mols)	D
	TRISAZO DYE			
466	Eboli Green CW		Benzidine Salicylic Acid Sulfanilic Acid	D

1-Amino-8-naphthol-3: 6-disulfonic Acid

See, H Acid

1-Amino-8-naphthol-4: 6-disulfonic Acid

See, K Acid

2-Amino-8-naphthol-3: 6-disulfonic Acid

See, 2R Acid

7-Amino-1-*n*aphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

See, 2R Acid

8-Amino-1-*n*aphthol-3: 5-disulfonic Acid (*C. A. nomen.*)

See, K Acid

8-Amino-1-*n*aphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

See, H Acid

8-Amino-1-*n*aphthol-4: 6-disulfonic Acid (*C. A. nomen.*)

See, 1-Amino-8-naphthol-3: 5-disulfonic Acid

8-Amino-1-*n*aphthol-5: 7-disulfonic Acid (*C. A. nomen.*)

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

Amino-naphthol-disulfonic Acid B

See, 1-Amino-8-Naphthol-3: 5-disulfonic Acid

Amino-naphthol-disulfonic Acid H

See, H Acid

Amino-naphthol-disulfonic Acid K

See, K Acid

Amino-naphthol-disulfonic Acid RR

See, 2R Acid

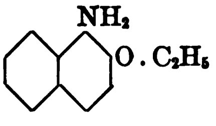
Amino-naphthol-disulfonic Acid SS

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

1-Amino-2-naphthol Ethyl Ether

Naphthylamine Ether

2-Ethoxy-1-*n*aphthylamine (*C. A. nomen.*)



$= C_{12}H_{13}NO = 187$

FORMATION.—1-Nitro-2-naphthol ethyl ether is reduced in an alcoholic solution with iron turnings and hydrochloric acid

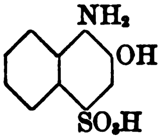
LITERATURE.—Lange, Zwischenprodukte, #2345, 2333

Dyes Derived from 1-Amino-2-naphthol Ethyl Ether

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
268	Naphthyl Blue Black N		1-Naphthylamine-4: 6- *and* 4: 7- disulfonic acids α- Naphthylamine	A
271	Diamine Blue 6 G		Amino-G acid β-Naphthol	D

1-Amino-2-naphthol-4-sulfonic Acid (*C. A. nomen.*)

1:2:4 Acid



$= C_{10}H_9NO_4S = 239$

STATISTICS.—Manufactured '18:—169,999 lbs.
Manufactured '19:—837,384 lbs.
Manufactured '20:—971,370 lbs.

FORMATION.—β-Naphthol is changed to the 1-nitroso-β-naphthol, which is treated with sodium bisulfite. Upon acidification the free sulfurous acid effects simultaneous reduction and sulfonation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 233
Lange, Zwischenprodukte, #2507

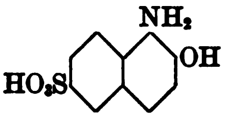
Dyes Derived from 1-Amino-2-naphthol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
29	Eriochrome Red B	I '14:— 5,491	3-Methyl-1-phenyl-5-pyrazolone	ACr

Dyes Derived from 1-Amino-2-naphthol-4-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
180	Erichrome Blue Black B	I '14:— 57,000 M' 17:— 9,326 M '18:— ? M '19:— ? I '20:— 20,317 M '20:— 29,255	α-Naphthol	ACr
181	Palatine Chrome Black 6B Salicine Black	I '14:—248,721 M '17:— ? M '18:—469,159 M '19:—739,372 I '20:— 2,001 M '20:— 1,074,248	β-Naphthol	ACr

1-Amino-2-*n*aphthol-6-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_4S = 239$

FORMATION.—Schaeffer's acid is treated with nitrous acid resulting in 1-nitroso-2-naphthol-6-sulfonic acid. This latter is reduced with zinc and hydrochloric acid

LITERATURE.—Meldola, Chem. Soc. Trans. **39**, 47 (1881)
Thorpe, Dic. Chemistry, **3**, 637

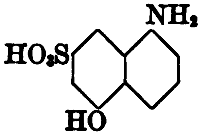
Dye Derived from 1-Amino-2-naphthol-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
656	Alizarin Green G	M '19:— ?	1:2-Naphthoquinone-4-sulfonic acid	M

1-Amino-5-naphthol-7-sulfonic Acid

5-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)

M Acid



$=C_{10}H_9NO_4S=239$

Formation.—By fusing 1-naphthylamine-5:7-disulfonic acid with caustic soda at 160–220°

Literature.—Cain, Intermediate Products (2d Ed.) 234
Thorpe, Dic. Chemistry, **3**, 638

Dyes Derived from 1-Amino-5-naphthol-7-sulfonic Acid

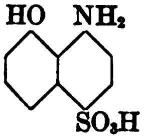
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
345	Oxamine Maroon		Benzidine Salicylic Acid	D
421	Oxamine Blue B	I '14:—35,891 I '20:— 13	Dianisidine Nevile-Winther's Acid	D

1-Amino-8-naphthol-4-sulfonic Acid

8-Amino-1-*n*aphthol-5-sulfonic Acid (*C. A. nomen.*)

Amino-naphthol-sulfonic Acid S

S Acid



$=C_{10}H_9NO_4S=239$

Statistics.—Manufactured '20:— ?

Formation.—By caustic soda fusion of 1-naphthylamine-4:8-disulfonic acid at 200–230°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 234
Thorpe, Dic. Chemistry, **3**, 638
Lange, Zwischenprodukte, #2524 *et seq.*

Dyes Derived from 1-Amino-8-naphthol-4-sulfonic Acid

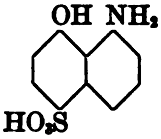
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
220	Palatine Black	I '14:—299,274 I '20:— 200	a-Naphthylamine Sulfanilic Acid	A
324	Chicago Blue 4R	I '14:— 1,199	Benzidine Croceine Acid	D
325	Columbia Blue R	I '14:— 3,071	Benzidine 1-Naphthol-3: 8-disulfonic Acid	D
336	Benzo Cyanine R	I '14:— 201	Benzidine H Acid	D
384	Chicago Blue 2R Diamine Blue C 2R	I '14:— 23,877	Tolidine Croceine Acid	D
387	Columbia Blue G	I '14:— 7,094	Tolidine 1-Naphthol-3: 8-disulfonic Acid	D
388	Chicago Blue R		Tolidine 1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
390	Benzo Cyanine B	I '14:— 201	Tolidine H Acid	D
420	Azidine Wool Blue B		Dianisidine Croceine Acid	D
422	Chicago Blue 4B	I '14:— 8,269	Dianisidine 1-Amino-8-naphthol-2: 4-disulfonic Acid	D

Dyes Derived from 1-Amino-8-naphthol-4-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
423	Chicago Blue B	M '18:— ?	Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	Dianisidine H Acid	D
	TRISAZO DYE			
465	Columbia Black Green D		Benzidine Salicylic Acid Aniline	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Salicylic Acid Sulfanilic Acid	D

1-Amino-8-naphthol-5-sulfonic Acid

8-Amino-1-*n*aphthol-4-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_4S = 239$

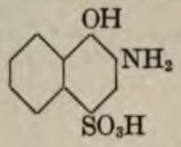
FORMATION.—By heating 1-naphthylamine-5: 8-disulfonic acid with 75 per cent caustic potash at about 150°

LITERATURE.—Ger. Pat. 75,055
Thorpe, Dic. Chemistry, **3**, 639
Lange, Zwischenprodukte, #2450

Dye Derived from 1-Amino-8-naphthol-5-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
218	Nigrophor BASF		*p*-Nitro-aniline 2: 5-Dichloro-aniline	MF

2-Amino-1-*n*aphthol-4-sulfonic Acid



$=C_{10}H_9NO_4S=239$

Formation.—By heating 2-nitroso-1-naphthol with 35 per cent sodium bisulfite solution

Literature.—Schmidt, J. pr. Chem [II], **44**, 531 (1891)
Thorpe, Dic. Chemistry, **3**, 639

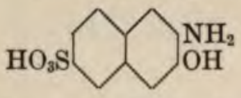
Dye Derived from 2-Amino-1-naphthol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
657	Oxazine Dye Alizarine Green B	I '14:—551	1:2-Naphthoquinone-4-sulfonic Acid	M

2-Amino-3-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid R

3-Amino-2-*n*aphthol-7-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_4S=239$

Formation.—From Amino-R acid (2-naphthylamine-3:6-disulfonic acid) by caustic soda fusion at 240°

Literature.—Lange, Zwischenprodukte, #2534
Thorpe, Dic. Chemistry, **3**, 639

Dye Derived from 2-Amino-3-naphthol-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
185	Monoazo Dye Anthracene Chrome Black	I '14:—51,577 I '20:— 2,339	β-Naphthol	M

2-Amino-5-naphthol-7-sulfonic Acid
See, J Acid

2-Amino-8-naphthol-6-sulfonic Acid
See, Gamma Acid

3-Amino-2-*n*aphthol-7-sulfonic Acid (*C. A. nomen.*)
See, 2-Amino-3-naphthol-6-sulfonic Acid

5-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)
See, 1-Amino-5-naphthol-7-sulfonic Acid

6-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)
See, J Acid

7-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)
See, Gamma Acid

8-Amino-1-*n*aphthol-4-sulfonic Acid (*C. A. nomen.*)
See, 1-Amino-8-naphthol-5-sulfonic Acid

8-Amino-1-*n*aphthol-5-sulfonic Acid (*C. A. nomen.*)
See, 1-Amino-8-naphthol-4-sulfonic Acid

Amino-naphthol-sulfonic Acid G
See, Gamma Acid

Amino-naphthol-sulfonic Acid J
See, J Acid

Amino-naphthol-sulfonic Acid R
See, 2-Amino-3-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid S
See, 1-Amino-8-naphthol-4-sulfonic Acid

Amino-naphthol-sulfonic Acid γ
See, Gamma Acid

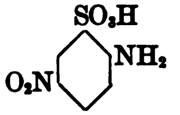
p-(2-Amino-4-nitro-anilino)-phenol (*C. A. nomen.*)

See, 2-Amino-4′-hydroxy-4-nitro-diphenylamine

2-Amino-5-nitro-benzene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

p-Nitro-aniline-*o*-sulfonic Acid ($NH_2 = 1$)

4-Nitro-aniline-2-sulfonic Acid ($NH_2 = 1$)



$= C_6H_6N_2O_5S = 218$

Statistics.—Manufactured 1918; amount not disclosed

Formation.—2-Chloro-5-nitro-benzene-sulfonic acid (by oleum sulfonation of *p*-chloro-nitro-benzene) is heated in an autoclave at 120–140° with alcoholic ammonia

Literature.—Cain, Intermediate Products (2d Ed.), 56

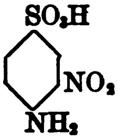
Dyes Derived from 2-Amino-5-nitro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
132	Lake Red P	I '14:—60,345 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,750	β-Naphthol	CL
133	Eriochrome Phosphine R	I '14:— 1,433	Salicylic Acid	ACr
	TRISAZO DYES			
458	Carbon Black		1-Naphthylamine-6- *or*-7-sulfonicAcid *m*-Phenylene-diamine *or* *m*-Tolylene-diamine *or* 1:3-Naphthylene-diamine-6-sulfonic Acid	D

4-Amino-3-nitro-benzene-sulfonic Acid (*C. A. nomen.*)

o-Nitro-aniline-*p*-sulfonic Acid ($NH_2 = 1$)

2-Nitro-aniline-4-sulfonic Acid ($NH_2 = 1$)



$= C_6H_6N_2O_5S = 218$

Statistics.—Manufactured '17:— ?

Formation.—From chloro-benzene-*p*-sulfonic acid by nitration, followed by amidation with ammonia

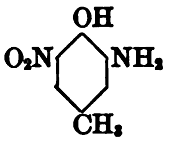
Literature.—Ullmann, Enzy. tech. Chemie, **1,** 443

Dye Derived from 4-Amino-3-nitro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
148	Monoazo Dye Fast Orange O	I '14:—1,250 M '17:— ?	β-Naphthol	CL

2-Amino-6-nitro-*p*-cresol (*C. A. nomen. OH = 1*)

o-Nitro-*o*-amino-*p*-cresol



$= C_7H_8N_2O_3 = 168$

Formation.—The above cresol derivative is obtained by partially reducing the 2:6-dinitro-*p*-cresol. This latter results either from the direct dinitration of *p*-cresol; or by the dinitration of *p*-toluidine, and subsequent hydrolysis with alkali

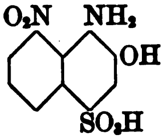
Literature.—Ber. **15,** 1859

Dye Derived from 2-Amino-6-nitro-*p*-cresol (*OH = 1*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
85	MONOAZO DYE Omega Chrome Black PV		Phenyl-1-naphthyl-amine-8-sulfonic Acid	ACr

1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

Nitro-1: 2: 4 Acid



$= C_{10}H_8N_2O_6S = 284$

FORMATION.—From 1-amino-2-naphthol-4-sulfonic Acid by nitration

LITERATURE.—Lange, Zwischenprodukte, #2688

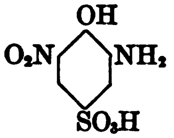
Dyes Derived from 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONAZO DYES			
183	Eriochrome Black T	I '14:—129,550 M '18:— ? M '19:— ? I '20:—2,624 M '20:— ?	α-Naphthol	ACr
184	Eriochrome Black A	I '14:— 96,570 M '17:— ? M '18:— ? M '19:—686,710 I '20:— 14,262 M '20:— ?	β-Naphthol	ACr

2-Amino-6-nitro-1-*p*henol-4-sulfonic Acid (*C. A. nomen. OH = 1*)

6-Nitro-2-amino-phenol-4-sulfonic Acid

2-Nitro-6-amino-phenol-4-sulfonic Acid



$= C_6H_6N_2O_6S = 234$

FORMATION.—From phenol by sulfonation, dinitration and partial reduction with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 129
Lange, Zwischenprodukte, #1130

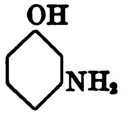
Dye Derived from 2-Amino-6-nitro-phenol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
159	MONOAZO DYE Acid Alizarin Black R	I '14:—16,800 M '19:— ? I '20:— 439 M '20:— ?	β-Naphthol	M

6-Amino-5-nitroso-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1-Nitroso-2-naphthylamine-6-sulfonic Acid

m-Amino-phenol



$= C_6H_7NO = 109$

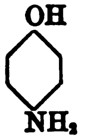
FORMATION.—By the fusion of Metanilic Acid (3-amino-benzene-sulfonic acid) with caustic soda at about 280–290°

LITERATURE.—Ber. **32**, 2112–2124
Lange, Zwischenprodukte, #582–584

Dyes Derived from *m*-Amino-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
90	Chrome Brown P		Picramic Acid	M
	ANILINE BLACK GROUP			
923	Fuscamine	I '14:— 54,005 M '19:— ? I '20:— 1,600 (M '20:—168,459)	*m*-Amino-phenol (x mols) [Oxidation on hair]	Fur

p-Amino-phenol



$=C_6H_7NO=109$

STATISTICS.—Imported '14:— 10,631 lbs.
Manufactured '17:— ?
Manufactured '18:—113,428 lbs.
Manufactured '19:—128,627 lbs.
Manufactured '20:— 41,474 lbs.

FORMATION.—Phenol is treated with sodium nitrite in the cold and the resulting *p*-nitroso-phenol is reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 117
Lange, Zwischenprodukte, #585–589

Dyes Derived from *p*-Amino-phenol

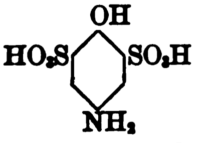
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYE			
14	Diphenyl Chrysoine	I '14:— 9,898	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols)	D
	MONOAZO DYE			
84	Azo Chromine		Pyrogallol	M

Dyes Derived from *p*-Amino-phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
709	Italian Green	I '14:— 298 M '18:— ? I '20:— 2,603	[Sulfur, etc.]	S
717	Vidal Black I	I '14:— 7,495	[Na_2S+S]	S
724	Immedial Black	I '14:— 54,696 M '18:— ?	1-Chloro-2: 4-dinitro-benzene [S+Na_2S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	1-Chloro-2: 4-dinitro-benzene [NaOH; S+Na_2S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	1-Chloro-2: 4-dinitro-benzene [Alcohol; S+Na_2S]	S
733	Immedial Indone	I '14:— 4,236	*o*-Toluidine [S+Na_2S]	S
734	Pyrogene Yellow	I '14:— 18,515 I '20:— 2,701	*p*-Nitro-benzyl chloride	S
	ANILINE BLACK GROUP			
923	Ursol P	I '14:— 54,005 M '19:— ? I '20:— 1,600 M '20:—168,459	*p*-Amino-phenol (x mols) [Oxidation]	Fur

4-Amino-1-*p*henol-2: 6-disulfonic Acid (*OH = 1*) (*C. A. nomen.*)

p-Amino-phenol-*a*-disulfonic Acid



$= C_6H_7NO_7S_2 = 269$

Note.—Position of the sulfonic groups not fully established.

FORMATION.—Nitroso-dimethyl-aniline hydrochloride or nitroso-phenol is introduced into a solution of sodium bisulfite, and warmed to effect solution. Then concentrated hydrochloric is added and the liquor boiled for two hours, using direct steam

LITERATURE.—Ger. Pat. 65,236
Beil. spl. II, 492
Lange, Zwischenprodukte, #1154

Dye Derived from 4-Amino-1-phenol-2:6-disulfonic Acid

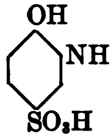
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
158	MONOAZO DYE Chrome Brown RR	I '14:—7,241 M '17:— ? I '20:—2,183	Pyrogallol	M

p-Amino-phenol Ethyl Ether

See, p-Phenetidine

2-Amino-1-phenol-4-sulfonic Acid (*C. A. nomen. OH = 1*)

o-Amino-phenol-p-sulfonic Acid



$= C_6H_7NO_4S = 189$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—Chloro-benzene is sulfonated and nitrated. The chloro-body is then hydrolyzed to the phenol by boiling with caustic soda, and finally reduced to 2-amino-phenol-4-sulfonic acid by means of sodium sulfide

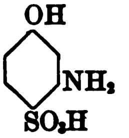
LITERATURE.—Cain, Intermediate Products (2d Ed.), 129

Dyes Derived from 2-Amino-1-phenol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
154.	Acid Alizarin Brown B Palatine Chrome Brown W	I '14:— 18,264 M '17:— ? M '18:— ? M '19:— ? I '20:— 845 M '20:— ?	*m*-Phenylene-diamine	M
155	Acid Alizarin Garnet R	I '20:— 201 M '20:— ?	Resorcinol	M
156	Acid Alizarin Violet N Palatine Chrome Violet	I '14:— 1,199 M '19:— ? M '20:— ?	β-Naphthol	ACr
157	Diamond Black PV	I '14:—285,074 M '20:— ?	1:5-Dihydroxy-naphthalene	M

3-Amino-1-*p*henol-4-sulfonic Acid (*C. A. nomen. OH = 1.*)

Amino-phenol-sulfonic Acid III



$= C_6H_7NO_4S = 189$

FORMATION.—By fusion with caustic soda of the aniline-disulfonic acid prepared by sulfonation of metanilic acid.

Note.—Amino-phenol-sulfonic acid III is not 5-amino-phenol-2-sulfonic acid

LITERATURE.—Ber. **39**, 3345

Lange, Zwischenprodukte, #942

Dyes Derived from 3-Amino-1-phenol-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dye			
339	Brilliant Orange G	I '14:—6,321 M '17:— ?	Benzidine Salicylic Acid	D
	Trisazo Dye			
481	Azo Corinth		Tolidine Naphthionic Acid Resorcinol	D

o-Amino-phenol-p-sulfonic Acid

See, 2-Amino-1-phenol-4-sulfonic Acid

Amino-phenol-sulfonic Acid III

See, 3-Amino-1-phenol-4-sulfonic Acid (OH = 1)

Amino-phenol-sulfonic Acid IV

3-Amino-1-phenol-6-sulfonic Acid (*not considered herein*)

Amino-phenol-sulfonic Acid V

3-Amino-1-phenol-5-sulfonic Acid (*not considered herein*)

p-(p-Amino-phenyl-azo)-benzene-sulfonic Acid

See, Amino-azo-benzene-sulfonic Acid

1-(p-Amino-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)

See, Dehydro-thio-p-toluidine

IV-Amino-2-phenyl-5-methyl-thiazol

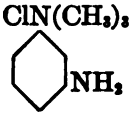
See, Dehydro-thio-p-toluidine

p-Amino-phenyl-toluthiazole

See, Dehydro-thio-p-toluidine

(m-Amino-phenyl)-trimethyl-ammonium Chloride

Trimethyl-m-amino-phenyl-ammonium chloride



$= C_9H_{15}N_2Cl = 186.5$

FORMATION.—*m*-Nitro-aniline by heating in methanol (methyl alcohol) solution with hydrochloric acid is transformed into *m*-nitro-phenyl-trimethyl-ammonium chloride (and *m*-nitro-dimethyl-aniline). The *m*-nitro-phenyl-trimethyl-ammonium chloride is dissolved in water and reduced with zinc dust and hydrochloric acid

LITERATURE.—Lange, Zwischenprodukte, #549,564
Green, Organic Coloring Matters (1908), 12

Dyes Derived from (*m*-Amino-phenyl)-trimethyl-ammonium Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
60	Azo Phosphine GO	I '14:— 50	Resorcinol	B
	DISAZO DYES			
222	Janus Yellow G	I '14:—2,250 I '20:— 758	Resorcinol *m*-Nitro-aniline	B
240	Janus Red B	I '14:— 250 I '20:— 176	*m*-Toluidine β-Naphthol	B
	TRISAZO DYE			
435	Janus Brown B		α-Naphthylamine *or m*-Toluidine Aniline *m*-Phenylene-diamine	B

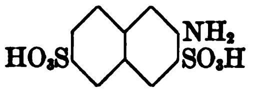
Amino-R Acid

2-Naphthylamine-3: 6-disulfonic Acid

β-Naphthylamine-disulfonic Acid R

β-Naphthylamine-α-disulfonic Acid

3-Amino-2: 7-naphthalene-disulfonic Acid (*C. A nomen.*)



$= C_{10}H_9NO_6S_2 = 303$

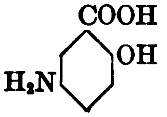
FORMATION.—By heating R salt with ammonia in an autoclave, in presence of ammonium bisulfite

LITERATURE.—Cain, Intermediate Products (2d Ed.), 207
Lange, Zwischenprodukte, #2594
Thorpe, Dic. Chemistry, 3, 604

Dyes Derived from Amino-R Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
120	Salmon Red	M '20:— ?	Dehydro-thio-*m*-xylidine	D
	DISAZO DYES			
314	Pyramine Orange 2R	I '14:— 2,789	Benzidine Nitro-*m*-phenylene-diamine	D
315	Congo Orange R	I '14:— 1,623 I '20:— 75	Benzidine Phenol [Ethylation]	D
316	Brilliant Congo G		Benzidine Broenner's Acid	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Benzidine Gamma Acid	D
358	Brilliant Dianol Red R Diphenyl Red	I '14:—14,305 I '20:— 3,704	Dichloro-benzidine Amino-R Acid (2 mols)	D
359	Trypan Red		Benzidine-sulfonic Acid Amino-R Acid (2 mols)	Medicinal
369	Brilliant Purpurin R	I '14:— 8,051	Tolidine Naphthionic Acid	D
370	Brilliant Congo R]	I '14:—19,133 I '20:—11,129	Tolidine Broenner's Acid	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Tolidine Phenol [Ethylation]	D

5-Amino-salicylic Acid



$=C_7H_7NO_3=153$

Statistics.—Imported '14:— 9,188 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—37,769 lbs.
Manufactured '20:— ?

Formation.—(1) From the corresponding nitro-salicylic acid by reduction. (2) By reducing the azo-dye, benzene-azo-salicylic acid

Literature.—Cain, Intermediate Products (2d Ed.), 150

Dyes Derived from 5-Amino-salicylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	α-Naphthylamine Nevile-Winther Acid *or* 1-naphthol-5-sulfonic Acid	ACr
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,016	a-Naphthylamine 1: 8-Dihydroxy-naphthalene- 4- sulfonic Acid	ACr
277	Anthracene Acid Black DSF	I '14:— 17,793	1-Naphthylamine-6- *and* 7-sulfonic Acids, etc.	M
	TETRAKISAZO DYE			
492	Anthracene Acid Brown B		1-Naphthylamine-6-sulfonic Acid (2 mols) *m*-Phenylene-diamine Amino-salicylic Acid (2 mols)	M ACr
	TRIPHENYL-METHANE DYE			
550	Chrome Bordeaux		Hydrol [Oxidation]	M

Amino-Schaeffer's Acid

See, Broenner's Acid

1-(4-Amino-?-sulfo-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)

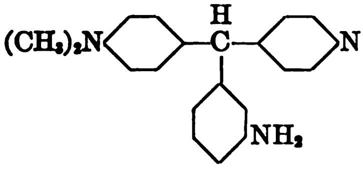
See, Dehydro-thio-*p*-toluidine-sulfonic Acid

4-Amino-4: 5-sultam-1: 3: 5-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)

See, 1: 8-Naphthasultam-2: 4-disulfonic Acid

m-Amino-tetramethyl-*p*′: *p*″-diamino-triphenyl-methane

N′: *N′*: *N″*: *N″*-Tetramethyl-*m*: *p′*: *p″*-methenyl-trisaniline (*C. A. nomen.*)



$= C_{23}H_{27}N_3 = 345$

FORMATION.—*m*-Nitro-benzaldehyde and dimethyl-aniline are condensed in the presence of acids or zinc chloride to *m*-nitro-tetramethyl-*p*: *p*-diamino-triphenyl-methane, which by reduction gives the *m*-amino-derivative

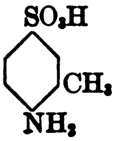
LITERATURE.—Schultz, Chemie Steinkohlenteers (3 aufl.), **1**, 115, 116.

Dye Derived from *m*-Amino-tetramethyl-*p*′: *p*″-diamino-triphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
510	Azo Green		Salicylic Acid	M

4-Amino-*m*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

o-Toluidine-*m*-sulfonic Acid ($CH_3 = 1$)



$= C_7H_9NO_3S = 187$

FORMATION.—From *o*-toluidine acid sulfate by heating in an oven

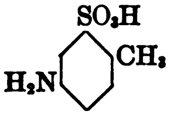
LITERATURE.—Cain, Intermediate Products (2d Ed.), 57

Dyes Derived from 4-Amino-*m*-toluene-sulfonic Acid (*$SO_3H = 1$*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYE			
24	Pigment Fast Yellow R		3-Methyl-1-phenyl-5-pyrazolone	CL
	MONOAZO DYE			
151	Orange RO, T	I '14:—90,747 M '17:— ? M '19:— ? I '20:— 20 M '20:— ?	β-Naphthol	A

5-Amino-*o*-toluene-sulfonic Acid (*C. A. nomen.* *$SO_3H = 1$*)

p-Toluidine-*o*-sulfonic Acid ($CH_3 = 1$)



$= C_7H_9NO_3S = 187$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From *p*-toluidine sulfate by heating in oven (baking process)

LITERATURE.—Green, Organic Coloring Matters (1908), 22
Lange, Zwischenprodukte, #839,237

Dyes Derived from 5-Amino-*o*-toluene-sulfonic Acid (*$SO_3H = 1$*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
150	Fast Yellow N		Diphenylamine	A
152	Lithol Rubine B Permanent Red 4B	I '14:—101,395 M '19:— ? I '20:— 2,983 M '20:— ?	3-Hydroxy-2-naphthoic Acid	CL

Dyes Derived from 5-Amino-o-toluene-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
852	Alizarin Direct Violet R	I '20:— 251	Quinizarin	A
865	Alizarin Direct Green G	I '14:— 2,000 I '20:— 31,851 M '20:— ?	Quinizarin *p*-Toluidine-3-sulfonic Acid (2 mols)	ACr

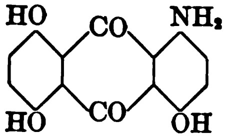
3'-Amino-(*p*-toluene-sulfo)-*p*-toluide (*C. A. nomen.*)
See, *N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide

4-(4-Amino-*m*-tolyl-azo)-*m*-toluene-sulfonic Acid (*C. A. nomen.*)
See, *o*-Amino-azo-toluene-sulfonic Acid

1-(4-Amino-*m*-tolyl)-3: 5-dimethyl-*b*enzothiazole (*C. A. nomen.*)
See, Dehydro-thio-*m*-xylidine

1-(6-Amino-*m*-tolyl)-3: 5-dimethyl-*b*enzothiazole (*C. A. nomen.*)
See, *iso*-Dehydro-thio-*m*-xylidine

1-Amino-4: 5: 8-trihydroxy-anthraquinone
8-Amino-1: 4: 5-trihydroxy-*a*nthraquinone (*C. A. nomen.*)



$= C_{14}H_9NO_5 = 271$

FORMATION.—4: 8-Dinitro-anthrarufin (*p*-dinitro-anthrarufin) is heated with sulfuric and boric acids at temperature of water bath, forming 1-nitro-4: 5: 8-trihydroxy-anthraquinone. (At higher temperatures the 1: 4: 5: 8-tetrahydroxy-anthraquinone is formed.) By reduction of the 1-nitro-derivative, the desired amino-derivative results.

LITERATURE.—Ger. Pat. 125,579; Frdl. 6, 335; Chem. Zen. 1901, II, 1189

Dye Derived from 1-Amino-4: 5: 8-trihydroxy-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
823	Algol Violet B	I '20:—69	Benzoyl chloride	V

Andresen's Acid

See, 1-Naphthol-3: 8-disulfonic Acid

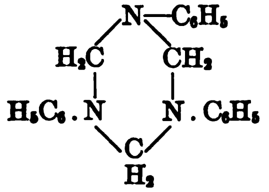
This trivial name also applied to:—

2-Naphthylamine-4: 7-disulfonic Acid

Anhydro-formaldehyde-aniline

1: 3: 5-Triphenyl-hexahydro-*s*-triazine (*C. A. nomen.*)

Formaniline



$=C_{21}H_{21}N_3=315$

Note.—Some of the older books give the formula as $C_6H_5N: CH_2$

STATISTICS.—Manufactured 1920, but in an undisclosed amount.

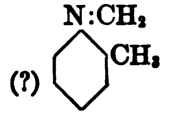
FORMATION.—By condensation of aniline and formaldehyde

LITERATURE.—Beilstein, Organische Chemie (3d auf.), 2, spl. 233
Cain and Thorpe, Synthetic Dyestuffs, 90

Dye Derived from Anhydro-formaldehyde-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
511	Parafuchsine Paramagenta	M '14:—65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline Aniline hydrochloride [Nitro-benzene and ferric chloride]	B

Anhydro-formaldehyde-*o*-toluidine



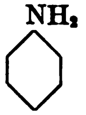
$=C_8H_9N=119$

FORMATION.—By condensation of *o*-toluidine and formaldehyde

Dyes Derived from Anhydro-formaldehyde-*o*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
513	New Fuchsine O	I '14:—300 M '18:— ? M '19:— ? M '20:— ?	*o*-Toluidine *o*-Toluidine hydrochloride [*o*-Nitro-toluene and ferrous chloride]	B

Aniline



$=C_6H_7N=93$

STATISTICS.—Imported '14:— 4,553,028 lbs.
Manufactured '17:—30,149,397 lbs.
Manufactured '18:—25,867,488 lbs.
Manufactured '19:—25,792,695 lbs.
Manufactured '20:—41,259,142 lbs.

FORMATION.—Benzene is nitrated to nitro-benzene with mixed nitric and sulfuric acid. The nitro-benzene is reduced to aniline with iron turnings and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 40
Lange, Zwischenprodukte, #69–82

Dyes Derived from Aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Stilbene Dye			
12	Diphenyl Citronine G		Aniline (2 mols) Dinitro-dibenzyl-disulfonic Acid *or* Dinitro-distilbene-disulfonic Acid *or* *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols)	D
	Pyrazolone Dyes			
19	Flavazine L Fast Light Yellow	I ’14:— 38,908 I ’20:— 9,327	3-Methyl-1-*p*-sulfophenyl-5-pyrazolone *or* Phenyl-hydrazine-*p*-sulfonic Acid Aceto-acetic Ethyl Ester	A
20	Flavazine S	I ’14:— 81,375 I ’20:— 1,500	1-*p*-Sulfophenyl-5-pyrazolone-3-carboxylic Acid *or* Phenyl-hydrazine-*p*-sulfonic Acid Oxal-acetic Ester	A
	Monoazo Dyes			
31	Amino-azo-benzene Spirit Yellow	M ’17:— ? M ’18:— 52,283 M ’19:— ? M ’20:— ?	Aniline (2 mols)	ss
32	Butter Yellow Oil Yellow	I ’14:— 4,062 M ’17:— 33,180 M ’18:— 27,669 M ’19:— 31,156 M ’20:— 74,182	Dimethyl-aniline	ss
33	Chrysoidine	I ’14:— 63,303 M ’17:—195,756 M ’18:—376,495 M ’19:—314,581 M ’20:—585,648	*m*-Phenylene-diamine	B

Dyes Derived from Aniline *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES *(continued)*			
34	Chrysoidine R	I '14:—111,006 M '17:— 58,115 M '18:—137,035 M '19:—220,542 M '20:—186,793 I '20:— 1,102	*m*-Tolylene-diamine	B
35	Sudan G	I '14:— 798	Resorcinol	ss
36	Sudan I Oil Orange	I '14:— 4,554 M '17:— 32,455 M '18:— 29,670 M '19:— 75,868 M '20:—116,624	β-Naphthol	ss
37	Ponceau 4 GB Croceine Orange	I '14:— 13,046 M '17:— ? M '18:— 30,824 M '19:— 17,274 M '20:— 96,573	Schaeffer's Acid	A
38	Orange G	I '14:— 48,456 M '17:— ? M '18:— ? M '19:— ? M '20:—120,874 I '20:— 100	G Acid	A
39	Ponceau G	M '17:— ? M '19:— ?	R Acid	A
40	Chromotrope 2R	I '14:— 5,000 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Chromotropic Acid	A
41	Fast Acid Fuchsine B	M '18:— ? M '19:— 26,699 M '20:— 30,678	H Acid	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
42	Amido Naphthol Red G	I '14:— 3,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,028 M '20:—132,637	Acetyl-H Acid	A
43	Tolane Red B, G		K Acid	A
44	Azo Archil R		2 R Acid	A
45	Brilliant Lake Red R	I '14:— 31,674 I '20:— 1,071	3-Hydroxy-2-naphthoic Acid	CL
58	Alizarin Yellow R	I '14:— 97,057 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	Salicylic Acid [Nitration]	M
124	Diazine Green S	I '14:— 1,340	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] Phenol	B
126	Indoine Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] β-Naphthol	B
127	Methyl Indone B	M '17:— ?	*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine] ["Amino-naphthols"]	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
128	Janus Gray B		*o*-Toluidine *p*-Tolylene-diamine [*or* Safranine], etc.	B
182	Fast Sulfon Violet 5BS Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	H Acid Benzene- (*or* Toluene-) sulfonyl Chloride	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	K Acid *p*-Nitro-aniline	A
216	Domingo Blue Black B		1-Amino-8-naphthol-3:5-disulfonic Acid *p*-Nitro-aniline	A
217	Naphthol Blue Black	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 340 M '20:— 2,608,864	H Acid *p*-Nitro-aniline	A
219	Chrome Patent Green N		K Acid Picramic Acid	ACr
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	*α*-Naphthylamine Gamma Acid	D
242	Sulfone Black G		1-Naphthylamine-6-*and* 7-sulfonic Acid 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
270	Brilliant Croceine 9B		Amino-G Acid R *and* G Acids	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid Phosgene	D
	Trisazo Dyes			
435	Janus Brown B		Trimethyl-*m*-amino-phenyl-ammonium chloride *or* *p*-Amino-benzyl-diethylamine *a*-Naphthylamine *or* *m*-Toluidine *m*-Phenylene-diamine	B
444	Crumpsall Direct Fast Brown B		Benzidine Salicylic Acid Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Benzidine Salicylic Acid Phenyl-gamma Acid	D
462	Erie Direct Black GX Direct Deep Black E, EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine H Acid *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine H Acid *m*-Tolylene-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine H Acid Phenol	D
465	Columbia Black Green D		Benzidine Salicylic Acid 1-Amino-8-Naphthol-4-sulfonic Acid	D

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
482	Alizarin Yellow FS		*o*-Toluidine *and* *p*-Toluidine [*or* Fuchsine] Salicylic Acid (3 mols)	M
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	*p*-Toluidine Aniline (2 mols) [Iron and nitro-benzene or arsenic Acid] *or* *p*-Nitro-benzaldehyde Aniline sulfate (2 mols) [Zinc chloride; ferrous chloride] *or* *p: p′*Diamino-diphenylmethane *or* anhydroformaldehyde-aniline [Nitro-benzene and ferric chloride]	B
512	Fuchsine Magenta	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	*p*-Toluidine *o*-Toluidine [Nitro-benzene, iron and zinc chloride or arsenic acid]	B
514	Red Violet 5R	I '14:— 331 I '20:— 750	[Magenta methylated or ethylated] *or* *o*-Toluidine *p*-Toluidine [Nitro-benzene, iron and zinc chloride or arsenic acid] [Methylation or ethylation]	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	[Para-rosaniline triphenylated] *or* Aniline (5 mols) *p*-Toluidine [Benzoic Acid]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	[Magenta phenylated] *or* Aniline (2-4 mols) *o*-Toluidine *p*-Toluidine [Benzoic Acid]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	[Magenta sulfonated] *or* *o*-Toluidine *p*-Toluidine [sulfonation]	A
525	Red Violet 5RS		[Magenta ethylated and sulfonated] *or* *o*-Toluidine *p*-Toluidine [Ethylation and sulfonation]	A
526	Acid Violet 4RS		[Magenta dimethylated, trisulfonated] *or* *o*-Toluidine *p*-Toluidine [Dimethylation, Trisulfonation]	A
535	Methyl Alkali Blue	I '14:— 273 M '18:— ? M '19:— ? I '20:— 29	[Triphenyl-*p*-rosaniline sulfonated] *or* *p*-Toluidine Aniline (5 mols) [Sulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	[Spirit Blue *or* Triphenyl-*p*-rosaniline+diphenyl-rosaniline sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (3-5 mols) [Sulfonation]	A
537	Methyl Blue for Silk Marine Blue B	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	[Triphenyl-*p*-rosaniline mono- *and* di-sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (4 mols) [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	[Triphenyl-*p*-rosaniline di- *and* tri-sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (4 mols) [Di-and Tri-sulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	[Spirit Blue *or* Triphenyl-*p*-rosaniline+diphenyl-rosaniline di- *and* tri-sulfonated] *or* *o*-Toluidine *p*-Toluidine Aniline (3-5 mols) [Di- *and* tri-sulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
540	Pacific Blue		[*p*-Rosaniline+diamino-diphenyl-methane and sulfonation] *or* *o*-Toluidine *p*-Toluidine Diamino-diphenyl-methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		[*β*-Naphthyl-rosaniline sulfonated] *or* *β*-Naphthylamine (3 mols) *o*-Toluidine *p*-Toluidine [Disulfonation]	B
	XANTHONE DYES			
572	Rhodamine G	I '14:— 2,648 I '20:— 517	[Rhodamine B heated with aniline to remove one C_2H_5 group] *or* Phthalic anhydride Diethyl-*m*-amino-phenol (2 mols)	B
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	[Dichloro-fluoresceine and aniline *or* *p*-toluidine; sulfonation] *or* Aniline (2 mols) Phthalic Anhydride Resorcinol [PCl_5; Sulfonation]	A
	ACRIDINE DYE			
606	Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	[Magenta by-product] *or* *p*-Toluidine *o*-Toluidine	B

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
622	Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 I '20:— 29,643 M '20:— 76,719	Nitroso-dimethyl-aniline Gallic Acid [Sulfonation] *or* [Gallocyanine treated with aniline; Sulfonation]	M
630	Cyanazurine		Nitroso-dimethyl-aniline Gallamide [Reduction]	M
640	Modern Azurine DH		Gallic Acid Methyl Ester Nitroso-dimethyl-aniline	M
646	Coreine AR		Gallamide Nitroso-diethyl-aniline *or* Diethyl-amino-azo- benzene [Sulfonation] *or* [Coreine RR; Sulfonation]	M
	AZINE DYES			
672	Azo Carmine G	I '14:— 17,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 196 M '20:— ?	Aniline (3 mols) α-Naphthylamine [Disulfonation]	A
673	Azo Carmine B	I '20:— 549	Aniline (3 mols) α-Naphthylamine [Trisulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
674	Rosinduline 2G	I '20:— 201	Aniline (3 mols) *a*-Naphthylamine [Trisulfonation; heated to 160°]	A
675	Rosinduline G	I '20:— 40	Aniline (2 mols) 1-Nitroso-2-naphthylamine-6-sulfonic Acid	A
679	Safranine	I '14:— 59,921 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	*p*-Tolylene-diamine *o*-Toluidine	B
680	Methylene Violet BN	I '14:— 1,521 M '17:— ? I '20:— 33	Aniline (2 mols) Dimethyl-*p*-phenylene-diamine [Oxidation]	B
682	Nigramine		Nitroso-dimethyl-aniline	B
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-*p*-phenylene-diamine *o*- *or* *p*-Toluidine [Oxidation]	B
684	Brilliant Rhoduline Red		N^1-Ethyl-4-*m*-tolylene-diamine Methyl-*o*-toluidine	B
686	Amethyst Violet		Diethyl-*p*-phenylene-diamine Diethyl-aniline [Oxidation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
687	Rosolane O	I '20:— 1,083	*p*-Amino-diphenylamine *o*-Toluidine [Oxidation]	B
688	Rosolane Mauve	I '14:— 796 I '20:— 3	Toluidines (3 mols) [Oxidation]	B
693	Milling Blue	I '14:— 3,082	Aniline (3 mols) α-Naphthylamine (2 mols) [Sulfonation] *or* Aniline (2 mols) Phenyl-α-naphthylamine (2 mols) Phenol [Sulfonation]	M
696	Indamine Blue		Aniline (excess) Amino-azo-benzene	B
697	Induline, Spirit Soluble	I '14:— 25,342 M '17:— ? M '18:— 8,589 M '19:—436,201 M '20:—140,400	Aniline (excess) Amino-azo-benzene	ss
698	Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—302,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess) Nitro-benzene [Iron] *or* Aniline (excess) Nitro-phenol	ss
699	Induline, Water Soluble	I '14:— 29,177 M '17:—183,739 M '18:— 91,724 M '19:—130,704 I '20:— 500 M '20:—168,048	Aniline (excess) Amino-azo-benzene [Sulfonation]	A

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Azine Dyes (*continued*)			
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:— 1,968,458 M '18:— 1,191,343 M '19:— 1,660,149 I '20:— 501 M '20:— 2,743,021	Aniline (excess) Nitro-benzene [Iron; Sulfonation] *or* Aniline (excess) Nitro-phenol [Sulfonation]	A
702	Para Blue		Aniline (3-4 mols) *o*-Toluidine *p*-Toluidine *p*-Phenylene-diamine *or* [Spirit Blue and *p*-Phenylene-diamine]	B
	Sulfur Dyes			
719	Thional Black	I '14:— 16,865	*p*- (*o*- *or* *m*-)Nitro-aniline *o*-Nitro-phenol (2 mols) [Na_2S+S]	S
729	Kryogene Pure Blue R		Aniline (2 mols) Dimethyl-*p*-phenylene-diamine [Na_2S+S] *or* [Methylene Violet; S, Na_2S]	S
	Anthraquinone and Allied Dyes			
851	Alizarin Direct Blue B	I '14:— 10,201 I '20:— 2,982	1: 5- (*and* 1: 8-) Amino-anthraquinone-sulfonic Acid [Dibromination, Sulfonation]	A
857	Erweco Alizarin Acid Blue R		Dinitro-anthraflavin-disulfonic Acid Aniline (2 mols) [Sulfonation]	ACr

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
861	Anthraquinone Blue SR	I '20:— 917	Aniline (2 mols) Tetrabromo-1:5-diamino-anthraquinone [Sulfonation]	ACr
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	Purpurin [*or* through Alizarin, *or* 2-Anthraquinone-sulfonic acid] [Sulfonation]	M
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	1-Nitro-anthraquinone-6-sulfonic Acid [Halogenation] *p*-Toluidine	ACr
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Aniline (2 mols) [Chloro-acetic, Sodamide] [*or* CS_2, KCN, etc.]	V
876	Indigo MLB Indigo White		Aniline (2 mols) [Chloro-acetic, Sodamide, Reduction] [*or* CS_2, KCN, etc., Reduction] [*or* Indigo, Reduction]	V

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Aniline (2 mols) etc. [*or* Indigo, Sulfonation]	A
878	Indigotine P		Aniline (2 mols), etc. [*or* Indigo, Sulfonation]	A
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 M '20:— ?	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Aniline (2 mols), etc. [*or* Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Aniline (2 mols), etc. [*or* Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Aniline (2 mols), etc. [*or* Indigo, Chlorination]	V

Dyes Derived from Aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
886	Brilliant Indigo BASF/G	I '14:— 12,057	Aniline (2 mols), etc. [*or* Indigo, Chlorination, Bromination]	V
889	Indigo Yellow 3G		Aniline (2 mols), etc. Benzoyl chloride [*or* Indigo, Benzoyl chloride]	V
890	Ciba Yellow G	I '14:— 48	Aniline (2 mols), etc. Benzoyl Chloride [Bromination] [*or* Indigo Yellow 3G, Bromination]	V
	ANILINE BLACK GROUP			
922	Aniline Black	I '14:— 1,470 M '19:— ? M '20:— ?	Aniline (x mols) [Oxidation on fiber]	MF

Aniline-2: 4-disulfonic Acid

See, 4-Amino-*m*-benzene-disulfonic Acid

Aniline-2: 5-disulfonic Acid

See, 2-Amino-*p*-benzene-disulfonic Acid

Aniline-*p*-sulfonic Acid

See, Sulfanilic Acid

2-Anilino-5-amino-benzene-sulfonic Acid (*C. A. nomen.*)

See, p-Amino-diphenylamine-2-sulfonic Acid

4-(*p*-Anilino-anilino)-*o*-cresol (*C. A. nomen.*)

See, 4-Phenylamino-4′-hydroxy-(phenyl-3′-tolylamine)

***p*-(*p*-Anilino-anilino)-*p*henol** (*C. A. nomen.*)

See, 4-Phenylamino-4′-hydroxy-diphenylamine

Anilino-benzene-sulfonic Acid (*C. A. nomen.*)

See, Diphenylamine-sulfonic Acid

8-Anilino-5-(*p*-hydroxy-anilino)-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

8-Anilino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, Phenyl-1-naphthylamine-8-sulfonic Acid

7-Anilino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)

See, Phenyl-gamma Acid

***m*-Anilino-*p*henol** (*C. A. nomen.*)

See, m-Hydroxy-diphenylamine

2-Anilino-3-*p*seudoindolone (*C. A. nomen.*)

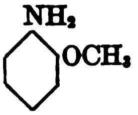
See, 2-Isatin Anilide

Aniline Salt

Note.—This is Aniline Hydrochloride.

See, Aniline

***o*-Anisidine** ($NH_2=1$)



$=C_7H_9NO=123$

Statistics.—Imported '14:—1,411 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

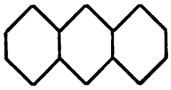
Formation.—*o*-Nitro-anisole is reduced at 100–110° by means of iron and hydrochloric acid

Literature.—Cain, Intermediate Products (2d Ed.), 71

Dyes Derived from o-Anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
93	Pigment Purple A Sudan R	I '14:— 99	β-Naphthol	CL
94	Azo Eosine	I '14:—1,001 M '18:— ? M '19:— ?	Nevile Winther Acid	A
95	Azo Cochineal Cochineal Scarlet B	I '14:— 952	1-Naphthol-4: 8-disulfonic Acid	A
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	Salicylic Acid	M
	DISAZO DYE			
259	Ponceau 10 RB	I '14:— 201	Sulfanilic Acid Croceine Acid	A

Anthracene



$=C_{14}H_{10}=178$

STATISTICS.—Imported '14:—$37,240 in value
Manufactured '17:— ?
Manufactured '18:— 225,552 lbs.
Manufactured '19:—1,381,944 lbs.
Imported '19:— 51,895 lbs.
Manufactured '20:— 711,258 lbs.
Imported '20:— 648,095 lbs.

FORMATION.—From coal-tar by extraction and purification

LITERATURE.—Cain, Intermediate Products (2d Ed.), 244

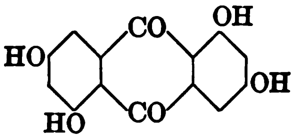
USES.—For manufacture of anthraquinone and anthraquinone derivatives

Dye Derived from Anthracene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
791	Indanthrene Olive G	I '20:—11 M '18:— ?	[Sulfur]	V

Anthrachrysone

1:3:5:7-Tetrahydroxy-anthraquinone



$= C_{14}H_8O_6 = 272$

FORMATION.—From 3:5-Dihydroxy-benzoic acid by heating with concentrated sulfuric acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 483
Beil. III, 436; III spl. 312

Dyes Derived from Anthrachrysone

Schultz Number for Dyes	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
790	Acid Alizarin Blue BB	I '14:—26,642 I '20:— 3,539	[Sulfonation, Nitration, Reduction, etc.]	ACr
796	Acid Alizarin Green G	I '20:— 1,334	[Sulfonation, Nitration, Sodium sulfide reduction]	ACr

1:9-Anthradiol (*C. A. nomen.*)

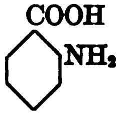
See, 1-Hydroxy-anthranol

Anthraflavic Acid

2: 6-Dihydroxy-anthraquinone (*not considered herein*)

Anthranilic Acid (*C. A. nomen. COOH = 1*)

o-Amino-benzoic Acid



$= C_7H_7NO_2 = 137$

Statistics.—Imported '14:— 106 lbs.
Manufactured '17:— ?
Manufactured '18:—11,826 lbs.
Manufactured '19:—22,976 lbs.
Manufactured '20:— ?

Formation.—Phthalic anhydride is melted and heated to 240°, whereupon ammonia gas is introduced, forming phthalimide. This latter is treated with sodium hypochlorite, forming anthranilic acid

Literature.—Cain, Intermediate Products (2d Ed.), 147
Lange, Zwischenprodukte, #357–367, 1619

Dyes Derived from Anthranilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
200	Lake Red D	I '14:— 2,428 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	CL
201	Pigment Scarlet G	M '17:— ? M '18:— ? M '19:— ?	Schaeffer's Acid	CL
202	Acid Alizarin Red B Palatine Chrome Red B	I '14:— 7,374 M '18:— ? M '19:—28,081 I '20:— 1,342 M '20:—67,817	R-Acid	ACr CL

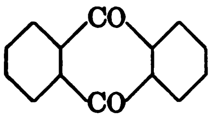
Dyes Derived from Anthranilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
832	Indanthrene Violet RN	I '14:—11,667 I '20:— 49	Anthranilic Acid (2 mols) 1:5-Dichloro-anthraquinone	V

Anthranol

See, 9-Anthrol

Anthraquinone



$= C_{14}H_8O_2 = 208$

STATISTICS.—Imported '14:— 29,850 lbs.
Manufactured '18:— ?
Manufactured '19:—294,260 lbs.
Manufactured '20:—539,619 lbs.

FORMATION.—(1) From anthracene by appropriate oxidation means; for example, chromic acid. (2) From *o*-benzoyl-benzoic acid by action of sulfuric acid. The *o*-benzoyl-benzoic acid is prepared by reacting together phthalic anhydride, benzene and aluminum chloride

LITERATURE.—Cain, Intermediate Products (2d Ed.), 244
Lange, Zwischenprodukte, #23, 648, 3065–3080

Dye Derived from Anthraquinone

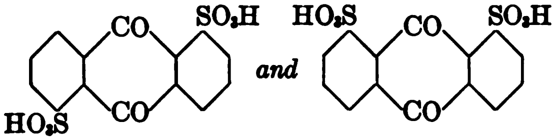
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
863	Anthraquinone Blue Green BXO	I '14:—6,552 I '20:— 849	[?]	A

Note.—Most of the dyes listed in the class "Anthraquinone and Allied Dyes" (*Schultz, #758–873*) *are derived indirectly from anthraquinone. These dyes are, however, not tabulated under anthraquinone, but under that intermediate from which directly derived.*

Anthraquinone-1: 5-*and*-1: 8-disulfonic Acids

Rho Acid *is trivial name for the 1: 5-disulfonic Acid*

Chi Acid *is trivial name for the 1: 8-disulfonic Acid*



$= C_{14}H_8O_8S_2 = 368$

STATISTICS.—The anthraquinone-1: 5-disulfonate was manufactured in 1918, 1919, 1920 by one company. Amount was not disclosed

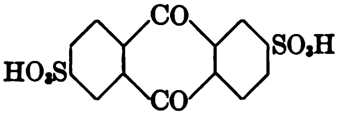
FORMATION.—Anthraquinone is sulfonated with strong oleum in the presence of mercury or mercuric oxide to a mixture of the 1: 5- *and* 1: 8-disulfonic acids, which are separated by crystallization

LITERATURE.—Cain, Intermediate Products (2d Ed.), 252
Lange, Zwischenprodukte, #3290–3293

USES.—The 1: 5-acid is employed for making anthrarufin, 1:5-dichloroanthraquinone, etc.

Anthraquinone-2: 6-disulfonic Acid

α-Anthraquinone-disulfonic Acid



$= C_{14}H_8O_8S_2 = 368$

FORMATION.—From anthraquinone by heating with 45 per cent oleum to 160–170° C., dilution with water, neutralization with caustic soda and evaporation until the 2: 6 acid crystallizes out (2: 7 acid in mother liquor)

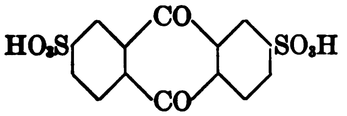
LITERATURE.—Cain, Intermediate Products (2d Ed.), 253
Lange, Zwischenprodukte, #3290

Dyes Derived from Anthraquinone-2: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
785	Alizarin GI Flavopurpurin	I '14:—49,021	[Alkaline Fusion]	M
786	Alizarine Red 3WS		[Alkaline fusion, sulfonation]	M

Anthraquinone-2: 7-disulfonic Acid

β-Anthraquinone-disulfonic Acid



$= C_{14}H_8O_8S_2 = 368$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From anthraquinone by heating with 45 per cent Oleum, dilution with water, neutralization with caustic soda, and evaporation until the 2: 6 disulfonic acid crystallizes out. The 2: 7 disulfonic acid is then obtained (as sodium salt) by evaporating this mother liquor to dryness

LITERATURE.—Cain, Intermediate Products (2d Ed.), 253
Lange, Zwischenprodukte, #3290

Dye Derived from Anthraquinone-2: 7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
784	Alizarin SX Isopurpurin	I '14:—14,273 M '19:— ? I '20:— 49 M '20:— ?	[Alkaline fusion]	M

α-Anthraquinone-disulfonic Acid

See, Anthraquinone-2: 6-disulfonic Acid

β-Anthraquinone-disulfonic Acid

See, Anthraquinone-2: 7-disulfonic Acid

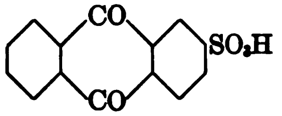
Anthraquinone-2-sulfonic Acid

Anthraquinone-β-sulfonic Acid

β Acid *or* Beta Acid

Silver salt (Sodium derivative)

β-Sulfonic Acid



$=C_{14}H_8O_5S=288$

STATISTICS.—Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:— ?

FORMATION.—From anthraquinone by sulfonating with an equal weight of 45–50 per cent oleum and heating up to 160° C., diluting, neutralizing with caustic soda, and evaporating to crystallization of the sodium salt ("Silver salt")

LITERATURE.—Cain, Intermediate Products (2d Ed.), 251
Lange, Zwischenprodukte, #3156–3163

Dyes Derived from Anthraquinone-2-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
778	Alizarin	I '14:—202,392 M '17:— ? M '18:— ? M '19:— ? I '20:— 8,575 M '20:— ?	[Oxidation]	M
779	Alizarin Orange	I '14:— 14,239 M '19:— ? I '20:— 500 M '20:— ?	[Alizarin, Nitration]	M
780	Alizarin Red	I '14:— 81,919 M '17:— ? I '20:— 12,628	[Alizarin, Sulfonation]	M
781	Erweco Alizarin Acid Red BS		[Alizarin, Sulfonation]	M
783	Purpurin		[Alizarin, Oxidation]	M
787	Alizarin Bordeaux B	I '20:— 20	[Alizarin, Oxidation]	M
788	Alizarin Cyanine R	I '20:— 16,781	[Alizarin Bordeaux B, Oxidation]	M
797	Alizarin Garnet R	I '14:— 720	[4-Nitro-alizarin, Reduction]	M
798	Alizarin Maroon W	I '20:— 2,014	[Crude Nitro-alizarin, Reduction]	M
799	Alizarin Cyanine G	I '20:— 339	[Alizarin Cyanine R, Amidation]	M
854	Alizarin Viridine DG	I '20:— 11,397	[Alizarin Bordeaux B] *p*-Toluidine (2 mols) [Sulfonation]	M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	[Purpurin] Aniline [Sulfonation]	M

Anthraquinone-β-sulfonic Acid

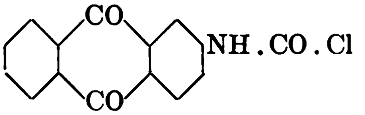
See, Anthraquinone-2-sulfonic Acid

2-Anthraquinone-urea Chloride

See, 2-Anthraquinonyl-urea Chloride

2-Anthraquinonyl-urea Chloride

2-Anthraquinone-urea Chloride



$= C_{15}H_8ClNO_3 = 286$

Formation.—From 2-Amino-anthraquinone in nitro-benzene solution by action of phosgene at 50°

Literature.—Lange, Zwischenprodukte, #3123

Dyes Derived from 2-Anthraquinonyl-urea Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
835	Helindone Orange GRN	I '20:— 74	2-Anthraquinonyl-urea chloride (2 mols)	V
836	Helindone Brown 2GN	I '20:—15,238	2-Anthraquinonyl-urea chloride (2 mols) Diamino-anthraquinones, [various]	V

Anthrarufin

1: 5-Dihydroxy-anthraquinone

STATISTICS.—Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:— ?

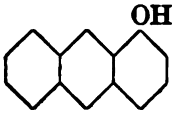
FORMATION.—This compound is obtained by the action of milk of lime on either anthraquinone-1:5-disulfonic acid or on 1:5-dinitroanthraquinone

LITERATURE.—Cain, Intermediate Products (2d Ed.), 257
Ullmann, Enzy. tech. Chemie, **1**, 481
Lange, Zwischenprodukte, #3269, 3272, 3287

Dye Derived from Anthrarufin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
858	Alizarin Saphirol B	M '18:— ? M '19:— ? I '20:— 28,210 M '20:— ?	[Sulfonation, Nitration, Reduction]	ACr

1-Anthrol (*C. A. nomen.*)
α-Anthrol
1-Hydroxy-anthracene



$= C_{14}H_{10}O = 194$

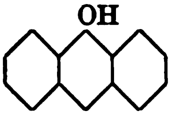
FORMATION.—From 1-anthracene-sulfonic acid by fusion with 5 parts of caustic soda at about 250°

LITERATURE.—Schmidt, Ber. **37**, 66 (1904)
Thorpe, Dic. Chemistry, **1**, 274; (1921 Ed.), **1**, 352

Dye Derived from 1-Anthrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
893	Alizarin Indigo G	I '20:—1,596	Dibromo-isatin chloride	V

9-Anthrol (*C. A. nomen.*)
9-Hydroxy-anthracene
Anthranol



$= C_{14}H_{10}O = 194$

FORMATION.—Anthraquinone is reduced with tin in boiling glacial acetic acid solution, or with iron and ferrous chloride solution

LITERATURE.—Cain, Intermediate Products (2d Ed.), 262
Thorpe, Dic. Chemistry, 1, 272; (1921 Ed.), 1, 349
Lange, Zwischenprodukte, #3038–3040

Dyes Derived from 9-Anthrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
763	Indanthrene Dark Blue BO	I '14:—11,096 I '20:—13,917 M '20:— ?	9-Anthrol (2 mols) [Glycerol (2 mols)]	V
764	Indanthrene Violet RT		9-Anthrol (2 mols) [Glycerol (2 mols), Halogenation] *or* [Indanthrene Dark Blue BO *and* Halogenation]	V
765	Indanthrene Green B	I '14:—72,251 M '19:— ? I '20:— 6,765 M '20:— ?	9-Anthrol (2 mols) [Glycerol (2 mols), Nitration] *or* [Indanthrene Dark Blue BO *and* Nitration]	V
872	Leucol Brown B	I '20:— 22		V

Armstrong's Acid

See, Naphthalene-1:5-disulfonic Acids

Armstrong's δ Acid

See, Naphthalene-1: 5-disulfonic Acid

Armstrong and Wynne's Acid

1-Naphthol-3-sulfonic Acid (*not considered herein*)

Armstrong and Wynne's Acid II

See, 2-Naphthylamine-5: 7-disulfonic Acid

5: 5′-Azoxy-bis-*o*-toluidine (*C. A. nomen.*)

See, Diamino-azoxy-toluene

***p*-Azoxy-*o*-toluidine**

See, Diamino-azoxy-toluene

B Acid

See, 1-Amino-8-naphthol-3: 5-disulfonic Acid

This trivial name also applied to

1-Amino-7-naphthol-3-sulfonic Acid

2: 3-Dihydroxy-naphthalene-6: 8-disulfonic Acid

Badische Acid

See, 2-Naphthylamine-8-sulfonic Acid

Baum's Acid

1-Naphthol-2-sulfonic Acid (*not considered herein*)

Bayer's Acid

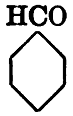
See, Croceine Acid

See, 2-Naphthylamine-7-sulfonic Acid

Benzal-bisxylidine (*C. A. nomen.*)

See, Diamino-dixylyl-phenyl-methane

Benzaldehyde



$= C_7H_6O = 106$

STATISTICS.—Imported '14:— 20,475 lbs.
Manufactured '17:—132,336 lbs.
Manufactured '18:—360,591 lbs.
Manufactured '19:—518,634 lbs.
Manufactured '20:—702,543 lbs.

FORMATION.—(1) From toluene by chlorination to benzylidine chloride, $C_6H_5CHCl_2$, and by heating this with milk of lime under pressure. (2) From toluene by oxidation with manganese dioxide and sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 138
Lange, Zwischenprodukte, #20–41

Dyes Derived from Benzaldehyde

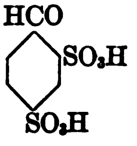
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYLMETHANE DYES			
495	Malachite Green	I '14:—183,852 M '17:—130,229 M '18:—290,416 M '19:—560,301 I '20:— 100 M '20:—654,237	Dimethyl-aniline (2 mols) [Oxidation]	B
499	Brilliant Green	I '14:— 73,904 M '18:— ? M '19:— ? I '20:— 25 M '20:— ?	Diethyl-aniline (2 mols) [Oxidation]	B
502	Guinea Green B Acid Green 3BG	I '14:— 49,971 M '17:— ? M '18:— ? M '19:— ? I '20:— 278 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A

Dyes Derived from Benzaldehyde (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
504	Light Green SF Bluish	I '14:— 6,693 M '17:— ? M '18:— ?	Benzyl-methyl-aniline (2 mols) [Sulfonation and Oxidation]	A
505	Light Green SF Yellowish	I '14:— 71,462 M '19:— ? I '20:— 7,490 M '20:— ?	Benzyl-ethyl-aniline (2 mols) [Sulfonation and Oxidation]	A
	ACRIDINE DYES			
604	Acridine Orange R		Dimethyl-*m*-phenylene-diamine (2 mols) [Ammonia removal; Oxidation]	B
605	Benzoflavine	I '14:— 600	*m*-Tolylene-diamine (2 mols) [Ammonia removal, Oxidation]	B

Benzaldehyde-disulfonic Acid

4-Formyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)



$= C_7H_6O_7S_2 = 266$

FORMATION.—Toluene is sulfonated with oleum to the 2:4-disulfonic acid, which is then oxidized with manganese dioxide

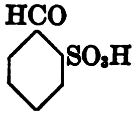
LITERATURE.—Lange, Zwischenprodukte, #899

Dye Derived from Benzaldehyde-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
579	Sulfo Rhodamine B Xylene Red B	I '14:—1,698	Diethyl-*m*-amino-phenol (2 mols) [Oxidation]	A

Benzaldehyde-*o*-sulfonic Acid

o-Formyl-*b*enzene-sulfonic Acid (*C. A. nomen.*)



$= C_7H_6O_4S = 186$

FORMATION.—By heating *o*-chloro-benzaldehyde with Na_2SO_3 at around 170–180° under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 146
Lange, Zwischenprodukte, #504–506

Dyes Derived from Benzaldehyde-*o*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class oj Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
506	Erioglaucine	I '14:—66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Ethyl-sulfobenzyl-aniline *or* Benzyl-ethyl-aniline (2 mols) [and sulfonation] [Oxidation]	A
553	Eriochrome Cyanine R	I '14:— 2,249 I '20:— 2,205	*o*-Cresotic Acid (2 mols) [Oxidation]	ACr

Benzamido- (*C. A. nomen. for $C_6H_5CO.NH$*)

See, Benzoylamino-

Note.—The C. A. name for this radical is the scientific one, and it is listed as an alternate, but in view of the widespread use of benzoylamino-, the latter is given precedence at the present time.

1-Benzamido-4-chloro-anthraquinone (*C. A. nomen.*)

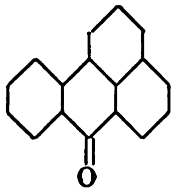
See, 1-Benzoylamino-4-chloro-anthraquinone

7-*meso*-Benzanthren-7-one (*C. A. nomen.*)

See, Benzanthrone

Benzanthrone

7-*meso-B*enzanthren-7-one (*C. A. nomen.*)



$= C_{17}H_{10}O = 230$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—(1) From anthranol and glycerol by condensation by means of sulfuric acid. (Anthranol is made from anthraquinone.) (2) From anthracene in sulfuric acid solution, by addition of glycerol and heating to 100–110° C. until the anthracene disappears. The reaction mass is then diluted with water, salted out and purified

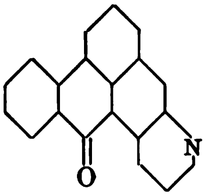
LITERATURE.—Cain, Intermediate Products (2d Ed.), 262
Lange, Zwischenprodukte, #3584

Dyes Derived from Benzanthrone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
763	Indanthrene Dark Blue BO	I '14:— 11,096 I '20:— 13,917	Benzanthrone (2 mols)	V
764	Indanthrene Violet RT		Benzanthrone (2 mols) [Halogenation] [*or* Indanthrene Dark Blue BO *and* halogenation]	V
765	Indanthrene Green B	I '14:—72,251 M '19:— ? I '20:— 6,765 M '20:— ?	Benzanthrone (2 mols) [Nitration] [*or* Indanthrene Dark Blue BO *and* Nitration]	V

Benzanthrone-quinoline

Phenanthroquinolinone (*C. A. nomen.*)



$=C_{20}H_{11}NO=281$

FORMATION.—From 2-amino-anthraquinone and glycerol by warming with condensing agents, for example, sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #3596
Ullmann, Enzy. tech. Chemie, 3, 314

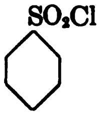
Dye Derived from Benzanthrone-quinoline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
846	Indanthrene Dark Blue BT		Benzanthrone-quinoline (2 mols)	V

Benzene-azo-diethylaniline

See, *p*-Diethylamino-azo-benzene

Benzene-sulfonyl Chloride



$= C_6H_5ClO_2S = 176.5$

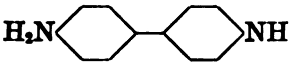
FORMATION.—From benzene-sulfonic acid by treatment with phosphorus pentachloride

LITERATURE.—Bucherer, Farbenchemie, 78, 150

Dye Derived from Benzene-sulfonyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
182	MONOAZO DYE Fast Sulfon Violet Brilliant Sulfon Red B	I '14:—4,871 I '20:—4,740	H Acid Aniline	A

Benzidine



$H_2N-C_6H_4-C_6H_4-NH_2 = C_{12}H_{12}N_2 = 184$

STATISTICS.—Imported '14:— 55,245 lbs.
Manufactured '17:—1,766,582 lbs.
Manufactured '18:—2,501,887 lbs.
Manufactured '19:—1,319,629 lbs.
Manufactured '20:—2,183,583 lbs.

FORMATION.—Nitro-benzene is reduced to hydrazo-benzene with zinc or iron in presence of caustic soda; the hydrazo-benzene is rearranged to benzidine by treatment with acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 89
Lange, Zwischenprodukte, #1204

Dyes Derived from Benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
15	Chicago Orange G		*p*-Nitro-toluene-*o*-sulfonic Acid	D
102	Diamond Flavine G	I '14:— 23,089 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Salicylic Acid	M
103	Dutch Yellow		Salicylic Acid [Sodium sulfite]	M
	DISAZO DYES			
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Nitro-*m*-phenylene-diamine *m*-Phenylene-diamine-disulfonic Acid	D
307	Congo Red	I '14:— 20,629 M '17:— ? M '18:—587,153 M '19:—873,734 M '20:— 1,502,630	Naphthionic Acid (2 mols)	D
308	Diazo Black B	I '14:— 62,854	Laurent's Acid (2 mols)	D
309	Glycine Red		α-Naphthyl-glycine Naphthionic Acid	D
310	Glycine Corinth		α-Naphthyl-glycine (2 mols)	D
311	Orange TA	I '14:— 602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid Cresol	D
312	Congo Corinth G	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Nevile Winther's Acid Naphthionic Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Croceine Acid Naphthionic Acid	D
314	Pyramine Orange RR	I '14:— 2,789	Nitro-*m*-phenylenediamine Amino-R Acid	D
315	Congo Orange G	I '14:— 1,623 I '20:— 75	Phenol Amino-R Acid [Ethylation]	D
316	Brilliant Congo G		Amino-R Acid Broenner's Acid	D
317	Pyramidol Brown BG		Resorcinol (2 mols)	D
318	Benzidine Puce		β-Naphthol	MF
319	Diamine Scarlet	I '14:— 41,175 I '20:— 11,340	Phenol G Acid [Ethylation]	D
320	Bordeaux	I '14:— 1,335 M '18:— ? M '19:— ? M '20:— ?	Croceine Acid (2 mols)	D
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Croceine Acid 1-Naphthol-4:8-disulfonic Acid	D
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	β-Naphthol 1-Naphthol-3:6:8-trisulfonic Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
323	Dianil Blue R	M '20:— ?	Chromotropic Acid (2 mols)	D
324	Chicago Blue 4R	I '14:— 1,199	Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
325	Columbia Blue R	I '14:— 3,071	1-Naphthol-3:8-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
326	Oxamine Violet Oxydiamine Violet BF	I '14:— 23,981 I '20:— 732	J Acid (2 mols)	D
327	Diamine Violet N	I '14:— 18,263 M '19:— ? M '20:— 92,503	Gamma Acid (2 mols)	D
328	Diamine Black RO Dianol Black RW	I '14:— 8,253	Gamma Acid (2 mols)	D
329	Diamine Brown V	M '19:— ?	*m*-Phenylene-diamine Gamma Acid	D
330	Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Gamma Acid 2:7-Naphthylene-diamine-sulfonic Acid	D
331	Alkali Dark Brown GV		Nitroso-β-naphthol Gamma Acid	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Gamma Acid Amino-R Acid	D
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Gamma Acid H Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
334	Diphenyl Blue Black	I '14:— 26,240	Ethyl-gamma Acid H Acid	D
335	Naphthamine Black RE	I '14:— 49,016	Gamma Acid K Acid	D
336	Benzo Cyanine R	I '14:— 201	H Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
337	Diamine Blue BB Benzo Blue BB	I '14:— 19,035 M '17:— 1,445,059 M '18:— 1,523,985 M '19:— 1,380,335 M '20:— 1,789,774	H Acid (2 mols)	D
338	Naphthamine Blue 2B	I '14:— 11,707 I '20:— 400	K Acid (2 mols)	D
339	Brilliant Orange G	I '14:— 6,321 M '17:— ?	Salicylic Acid 3-Amino-phenol-4-sulfonic Acid	D
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Salicylic Acid Naphthionic Acid	D
340 (1)	Chlorazol Orange 2R		Salicylic Acid 2-Naphthylamine-7-sulfonic Acid	D
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Salicylic Acid R Salt	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
342	Chrysamine G	I '14:— 608 M '17:— 26,061 M '18:— 28,846 M '19:— 54,279 I '20:— 9,810 M '20:— 49,342	Salicylic Acid (2 mols)	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Gamma Acid Salicylic Acid	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,957 M '20:—257,872	Salicylic Acid Gamma Acid	D
345	Oxamine Maroon		Salicylic Acid 1-Amino-5-naphthol-7-sulfonic Acid	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	J Acid Salicylic Acid	D
347	Diphenyl Brown RN		Salicylic Acid Methyl-gamma Acid	D
348	Diphenyl Brown BN	I '14:— 13,471	Salicylic Acid Dimethyl-gamma Acid	D
349	Diamine Brown B	I '20:— 24	Salicylic Acid Phenyl-gamma Acid	D
350	Alkali Yellow R		Salicylic Acid Dehydrothio-*p*-toluidine-sulfonic Acid	D
351	Cresotine Yellow G	I '14:— 1,748 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	*o*-Cresotic Acid (2 mols)	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
352	Direct Violet R	I '14:— 661 M '19:— ?	*m*-Tolylene-diamine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
353	Direct Indigo Blue BN	I '14:— 6,000	1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid H Acid	D
354	Direct Gray R	I '20:— 4,927	1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
	TRISAZO DYES			
438	Melogene Blue BH	M '17:— ? M '18:— ?	H Acid (2 mols) *p*-Xylidine	D
439	Direct Indigo Blue A	M '18:— ?	H Acid (2 mols) *m*-Amino-*p*-cresol Methyl Ether	D
440	Direct Indigo Blue BK		Gamma Acid (2 mols) *m*-Amino-*p*-cresol Methyl Ether	D
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	H Acid (2 mols) *a*-Naphthylamine	D
442	Direct Black V	I '14:—145,738	Gamma Acid *a*-Naphthylamine 2 R Acid	D
443	Direct Indone Blue R		*a*-Naphthylamine H Acid 2 R Acid	D
444	Crumpsall Direct Fast Brown B		Salicylic Acid Aniline Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Salicylic Acid Aniline Phenyl-gamma Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
446	Benzo Olive	I '14:— 1,149	Salicylic Acid α-Naphthylamine H Acid	D
447	Benzo Gray S Extra	I '14:— 802	Salicylic Acid α-Naphthylamine Nevile Winther's Acid	D
448	Diamine Bronze G	I '14:— 4,495	Salicylic Acid H Acid *m*-Phenylene-diamine	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	2 R Acid Salicylic Acid *m*-Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Aniline H Acid *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Aniline H Acid *m*-Tolylene-diamine	D
464	Erie Direct Green E T	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Aniline H Acid Phenol	D
465	Columbia Black Green D		Salicylic Acid Aniline 1: 8-Amino-naphthol-4-sulfonic Acid	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
466	Eboli Green		1-Amino-8-naphthol-3: 5-disulfonic Acid Salicylic Acid Sulfanilic Acid	D
467	Diphenyl Green G	I '20:— 2,205	Phenol H Acid *o*-Chloro-*p*-nitro-aniline	D
468	Diphenyl Green 3G		Salicylic Acid H Acid *o*-Chloro-*p*-nitro-aniline	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	*m*-Phenylene-diamine H Acid 2: 5-Dichloro-aniline	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ?	Phenol H Acid 2: 5-Dichloro-aniline	D
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	H Acid (2 mols) 2:5-Dichloro-aniline	D
472	Chloramine Blue HW		Gamma Acid H Acid 2: 5-Dichloro-aniline	D
473	Diamine Black HW	I '20:— 342	Gamma Acid H Acid *p*-Nitro-aniline	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Phenol H Acid *p*-Nitro-aniline	D

Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
475	Diamine Green G Oxamine Green G	I ’14:— 7,329 M ’17:— ? M ’18:— 29,118 M ’19:—136,638 I ’20:— 1,332 M ’20:— 53,292	Salicylic Acid H Acid *p*-Nitro-aniline	D
476	Benzamine Brown 3GO	I ’14:— 16,988 M ’17:— ? M ’18:— ? M ’19:— ? M ’20:—623,757	Sulfanilic Acid *m*-Phenylene-diamine Salicylic Acid	D
477	Congo Brown G Naphthamine Brown 4G	I ’14:— 52,141 M ’17:— ? M ’18:— ? M ’19:— ? I ’20:— 443 M ’20:—229,489	Sulfanilic Acid Resorcinol Salicylic Acid	D
478	Columbia Green	I ’14:— 45,162 M ’18:— ? I ’20:— 7,555	Salicylic Acid Sulfanilic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
479	Dianil Black R		Chromotropic Acid Naphthionic Acid *m*-Phenylene-diamine	D
480	Congo Brown R	I ’14:— 3,045	Resorcinol Salicylic Acid Laurent’s Acid	D
	TETRAKISAZO DYES			
489	Hessian Brown BBN		Sulfanilic Acid (2 mols) Resorcinol (2 mols)	D
490	Cotton Brown A	I ’14:— 29,074	Naphthionic Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

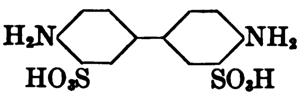
Dyes Derived from Benzidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
712	Kyrogene Yellow G	I '14:— 1,126 I '20:— 1,543	*m*-Tolylene-dithio-urea [Sulfur]	S
714	Thiophor Yellow Bronze G		*p*-Phenylene-diamine *p*-Amino-acetanilide [Sulfur]	S

Benzidine-disulfonic Acid

6: 6'-Diamino-*m*: *m*'-bi(*b*enzene-sulfonic) Acid (*C. A. nomen.*)

4: 4'-Diamino-diphenyl-3: 3'-disulfonic Acid



$= C_{12}H_{12}N_2O_6S_2 = 344$

FORMATION.—From benzidine sulfate by heating with 2 parts of sulfuric acid at about 210° for forty-eight hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 94
Griess and Duisberg, Ber, **22**, 2464 (1889)
Cf. Griess, Ber., **14**, 300 (1881)
Cf. Farbenfabriken, Ger. Pat. 27954

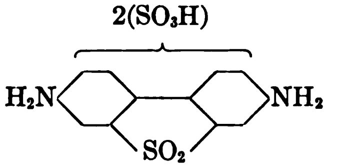
Dyes Derived from Benzidine-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
360	Pyramine Orange R	I '14:— 21,329 I '20:— 7,821	Nitro-*m*-phenylene-diamine	D
	TRISAZO DYES			
459	Benzo Black Blue G		Nevile-Winther's Acid (2 mols) α-Naphthylamine	D
460	Benzo Black Blue 5G	I '14:— 602	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols) α-Naphthylamine	D

Benzidine-sulfon-disulfonic Acid

4: 4′-Diamino-diphenyl-2: 2′-sulfon-disulfonic Acid

2: 7-Diamino-9-dioxide-? :?-*d*ibenzothiophene-disulfonic Acid (*C A. nomen.*)



$= C_{12}H_{10}N_2O_8S_3 = 406$

Formation.—Benzidine sulfate is heated with 40 per cent oleum for 1 hour at 100° in an autoclave, and then at 150° until a sample dissolves in hot water and does not give a yellow precipitate with alkali

Literature.—Lange, Zwischenprodukte, #1275

Dyes Derived from Benzidine-sulfon-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
361	Disazo Dye Sulfonazurine	I '14:—300	Phenyl-α-naphthylamine (2 mols)	D

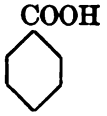
Formation.—From benzidine sulfate by evaporating to dryness with dilute sulfuric acid (1½ mols), and then heating in air bath at about 170° for 24 hours

Literature.—Ullmann, Enzy. tech. Chemie, **2**, 318

Dyes Derived from Benzidine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
359	Trypan Red		Amino-R Acid (2 mols)	Medicinal
	TETRAKISAZO DYE			
491	Dianil Black PR		Gamma Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

Benzoic Acid



$=C_7H_6O_2=122$

Statistics.—Imported '14:—352,201 lbs.
Manufactured '17:—219,210 lbs.
Manufactured '18:—282,212 lbs.
Manufactured '19:—720,320 lbs.
Manufactured '20:—743,113 lbs.

Formation.—(1) From toluene by chlorination to benzo-trichloride, and hydrolysis with milk of lime. (2) From toluene by direct oxidation with nitric acid

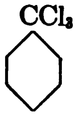
Literature.—Ullmann, Enzy. tech. Chemie, **2**, 325
Lange, Zwischenprodukte, #24, 59

Dyes Derived from Benzoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYLMETHANE DYES			
509	Chrome Green		Hydrol [Oxidation]	M
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	Aniline (5 mols) *p*-Toluidine *or* [*p*-Rosaniline triphenylated]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (2–4 mols) *o*-Toluidine *p*-Toluidine *or* [Fuchsine *or* Rosaniline base phenylated]	ss
	ANTHRAQUINONE AND ALLIED DYES			
770	Alizarin Yellow A		Pyrogallol	M
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Gallic Acid	M

Benzo-trichloride

α-Trichloro-*t*oluene (*C. A. nomen.*)



$$=C_7H_5Cl_3=195.5$$

STATISTICS.—Imported '14:—very small
Manufactured '18:— ?
Manufactured '20;— ?

FORMATION.—From toluene by treatment with chlorine, preferably in presence of catalyst

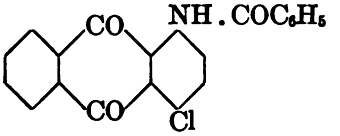
LITERATURE.—Cain, Intermediate Products (2d Ed.), 19

Dyes Derived from Benzo-trichloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYE			
610	Quinoline Red		Quinaldine Isoquinoline	B
	ANTHRAQUINONE AND ALLIED DYES			
770	Alizarin Yellow A		Pyrogallol	M

1-Benzoylamino-4-chloro-anthraquinone

1-Benzamido-4-chloro-anthraquinone (*C. A. nomen.*)



$= C_{21}H_{12}ClNO_3 = 361.5$

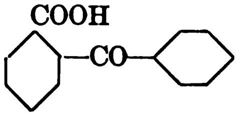
FORMATION.—By heating 1-Amino-4-chloro-anthraquinone with benzoyl chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 164

Dye Derived from 1-Benzoylamino-4-chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
833	Algol Olive R	I '14:— 13,334 I '20:— 461	1-Benzoylamino-4-amino-anthraquinone [Chloro-sulfonic acid]	V

o-Benzoyl-benzoic Acid



$= C_{14}H_{10}O_3 = 226$

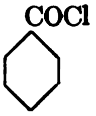
STATISTICS.—Manufactured 1920:— ?

FORMATION.—By condensation of phthalic anhydride and benzene in presence of aluminum chloride

LITERATURE.—Heller, Zeit. angew. Chem., **19**, 669 (1906)
Heller, Ber., **41**, 3631 (1908)
Cain, Intermediate Products (2d Ed.), 249

USES.—For synthesis of anthraquinone

Benzoyl Chloride



$= C_7H_5ClO = 140$

STATISTICS.—Manufactured '17:—20,621 lbs.
Manufactured '18:— 6,585 lbs.
Manufactured '19:— ?
Manufactured '20:—14,277 lbs.

FORMATION.—From benzoic acid by action of sulfuryl chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 329
Lange, Zwischenprodukte, #42

Dyes Derived from Benzoyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
814	Algol Yellow WG	I '14:— 5,185 I '20:— 4	1-Amino-anthraquinone	V
815	Algol Scarlet G	I '20:— 959	1-Amino-4-methoxy-anthraquinone	V

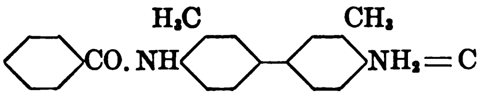
Dyes Derived from Benzoyl Chloride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
816	Algol Red 5G	I '14:— 1,338 I '20:— 51	1:4-Diamino-anthraquinone Benzoyl chloride (2 mols)	V
817	Algol Yellow R	I '14:— 4,887 I '20:— 2,299 M '20:— ?	1:5-Diamino-anthraquinone Benzoyl chloride (2 mols)	V
818	Algol Pink R	I '14:— 126 I '20:— 1,368	1-Amino-4-hydroxy-anthraquinone	V
819	Algol Red R	I '14:— 2,322 I '20:— 7,335	1:5-Diamino-anthraquinone Benzoyl chloride (2 mols) [Oxidation]	V
821	Algol Brilliant Violet 2B	I '14:— 3,893 I '20:— 827	Diamino-anthrarufin Benzoyl chloride (2 mols)	V
822	Algol Brilliant Orange FR	I '14:— 6,195 I '20:— 482	1:2:4-Triamino-anthraquinone (?)	V
823	Algol Violet B	I '20:— 69	1-Amino-4:5:8-trihydroxy-anthraquinone	V
870	Algol Corinth R	I '20:— 134	1-Amino-anthraquinone 2-Chloro-anthraquinone [Nitration, Reduction]	V

Dyes Derived from Benzoyl Chloride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
889	Indigo Yellow 3G		Indigo *or* Phenyl-glycine *or* Phenyl-glycine-*o*-carboxylic acid *or* Thiocarbanilide *or* Aniline *or* Phthalic Anhydride	
890	Ciba Yellow G	I '14:— 48	Indigo *or* Phenyl-glycine *or* Phenyl-glycine-*o*-carboxylic acid *or* Thiocarbanilide *or* Aniline *or* Phthalic Anhydride [Bromination]	

N-Benzoyl-o-tolidine



$=C_{21}H_{20}N_2O=316$

STATISTICS.—Manufactured 1919:— ?

FORMATION.—Tolidine is heated in toluene solution with benzoyl chloride under a reflux condenser

LITERATURE.—Lange, Zwischenprodukte, #1281

Dyes Derived from *N*-Benzoyl-*o*-tolidine

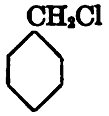
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
104	Benzoyl Pink		Nevile-Winther's Acid	D

[(*N*-Benzyl-anilino) -methyl]-*b*enzene-sulfonic Acid (*C. A. nomen.*)

See Dibenzyl-aniline-sulfonic Acid

Benzyl Chloride

α-Chloro-*t*oluene (*C. A. nomen.*)



$= C_7H_7Cl = 126.5$

Statistics.—Imported '14:— 4,589 lbs.
Manufactured '17:— 136,179 lbs.
Manufactured '18:— 690,930 lbs.
Manufactured '19:— 720,953 lbs.
Manufactured '20:—1,246,412 lbs.

Formation.—From boiling toluene by passing in chlorine until the theoretical amount (37.5%) has been absorbed

Literature.—Cain, Intermediate Products (2d Ed.), 15
Lange, Zwischenprodukte, #5

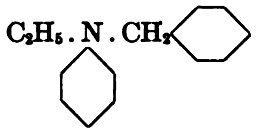
Dyes Derived from Benzyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Triphenylmethane Dyes			
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 M '17:— ? I '20:— 3,313	[Benzylation of Methyl Violet] *or* Dimethyl-aniline (3 mols) Phenol	B
523	Fast Green	I '14:— 14,347 I '20:— 3,612	*m*-Nitro-benzaldehyde Dimethyl-aniline (2 mols) Benzyl chloride (2 mols) [Sulfonation, Oxidation]	A
	Xanthone Dye			
586	Chrysoline	I '20:— 1,402	Phthalic Anhydride Resorcinol (2 mols)	A

Benzyl-ethyl-aniline

Ethyl-benzyl-aniline

N-Ethyl-*N*-phenyl-*b*enzylamine (*C. A. nomen.*)



$= C_{15}H_{17}N = 211$

STATISTICS.—Imports 1914:—small amount
Manufactured 1917:— ?
Manufactured 1918:— ?
Manufactured 1919:— ?
Manufactured 1920:—159,636 lbs.

FORMATION.—From one part of ethyl-aniline and two parts of benzyl chloride, by boiling under a reflux condenser for four hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 69

Dyes Derived from Benzyl-ethyl-aniline

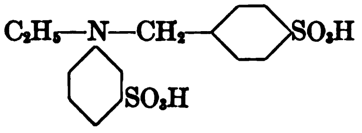
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
505	Light Green SF Yellowish	I '14:— 71,462 M '19:— ? I '20:— 7,490 M '20:— ?	Benzyl-ethyl-aniline (2 mols) Benzaldehyde [Sulfonation; Oxidation]	A
506	Erioglaucine	I '14:— 66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Benzyl-ethyl-aniline (2 mols) Benzaldehyde-*o*-sulfonic acid [Sulfonation; Oxidation]	A
508	Xylene Blue AS	I '14:— 8,238 I '20:— 5,573	Benzyl-ethyl-aniline (2 mols) 3-Methyl-benzaldehyde-4:6-disulfonic Acid [Oxidation]	A

Dyes Derived from Benzyl-ethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
545	Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) *m*-Nitro-benzaldehyde *or m*-Hydroxy-benzaldehyde [Sulfonation; Oxidation]	A

Benzyl-ethyl-aniline-disulfonic Acid

N-Ethyl-*N*-(*p*-sulfo-benzyl)-*m*etanilic Acid (*C. A. nomen.*)



$= C_{15}H_{17}NO_6S_2 = 371$

Note.—Position of sulfonic group in the benzyl radical is not fully determined

STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

FORMATION.—Benzyl-ethyl-aniline is dissolved with cooling in two parts of 20 per cent oleum, and is then treated with two and a half parts of 80 per cent oleum, and the mixture warmed at 60° until the sulfonation is complete

LITERATURE.—Cain, Intermediate Products (2d Ed.), 70
Lange, Zwischenprodukte, #1500

Dye Derived from Benzyl-ethyl-aniline-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
528	Fast Acid Violet 10B	I '14:— 12,919 M '17:— ? M '18:— ? M '19:— ? I '20:— 10,086 M '20:— ?	Hydrol [Oxidation]	A

Benzyl-ethyl-aniline-sulfonic Acid [1]

See, Ethyl-sulfobenzyl-aniline

Benzyl-ethyl-*p*-phenylene-diamine-sulfonic Acid

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

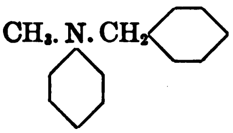
3-Benzylimino-4-methyl-diphenylamine

See, N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine

Benzyl-methyl-aniline

Methyl-benzyl-aniline

N-Methyl-*N*-phenyl-*b*enzylamine (*C. A. nomen.*)



$$=C_{14}H_{15}N=197$$

FORMATION.—From methyl-aniline and benzyl chloride by heating together on a water bath for a few hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 69

---

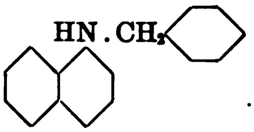
[1] The data and the dye table should have been placed here rather than under ethyl-sulfobenzyl-aniline. — The Author.

Dyes Derived from Benzyl-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
504	Light Green SF Bluish	I '14:— 6,693 M '17:— ? M '18:— ?	Benzyl-methyl-aniline (2 mols) Benzaldehyde [Sulfonation; Oxidation]	A
527	Acid Violet 4BN	I '14:— 29,184 I '20:— 23,335 M '20:— ?	Ketone [Sulfonation]	A

Benzyl-α-naphthylamine

N-Benzyl-1-*n*aphthylamine (*C. A. nomen.*)



$= C_{17}H_{15}N = 233$

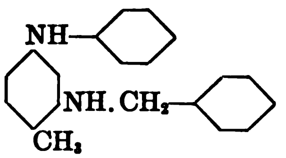
FORMATION.—α-Naphthylamine is heated in an autoclave with benzyl chloride in the presence of a catalyst

LITERATURE.—Lange, Zwischenprodukte, #1363

Dye Derived from Benzyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
654	Nile Blue 2B		5-Diethylamino-2-nitroso-phenol	B

N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine (*C. A. nomen* NH_2=1)
Phenyl-*p*-amino-benzyl-*o*-toluidine (CH_3 = *1*)
3-Benzylimino-4-methyl-diphenylamine



$=C_{20}H_{20}N_2=288$

FORMATION.—4-*m*-Tolylene-diamine hydrochloride is melted with aniline at 220–270°, forming N^1-phenyl-4-*m*-tolylene-diamine. This latter body upon being warmed with benzyl chloride with or without a diluent such as alcohol forms the benzyl-derivative desired

LITERATURE.—Lange, Zwischenprodukte, #1621, 1622, 1734

Dyes Derived from N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	Nitroso-dimethyl-aniline	B
684	Rhoduline Red B		Nitroso-ethyl-aniline	B
684	Rhoduline Red G		Nitroso-ethyl-*o*-toluidine	B

Beta = β

Note.—This is not considered in the alphabetical arrangement, e.g. beta-Naphthol is indexed as β-Naphthol under "N". However β-Naphthol is placed after α-Naphthol

Beta Acid

See, Anthraquinone-2-sulfonic Acid

Beta-Naphthol

See, β-Naphthol *under N*

Bi-compounds

See, Di-compounds, *e.g.,* for binitro-benzol (or -benzene), see dinitro-benzene

***p*:*p*′-Bis(diethylamino)-*benz*ohydrol** (*C. A. nomen.*)
See, *p*: *p*′-Tetraethyl-diamino-benzohydrol

***p*:*p*′-Bis(diethylamino)-*benz*ophenone** (*C. A. nomen.*)
See, *p*: *p*′-Tetraethyl-diamino-benzophenone

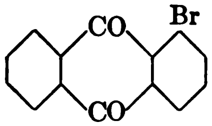
***p*:*p*′-Bis(dimethylamino)-*benz*ohydrol** (*C. A. nomen.*)
See, Hydrol

***p*:*p*′-Bis(dimethylamino)-*benz*ophenone** (*C. A. nomen.*)
See, Ketone

3:5-Bis[β-(5-hydroxy-7-sulfo-2-naphthyl)-carbamido]-*p*-toluenesulfonic Acid (*C. A. nomen.*)
See, Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)

Broenner's Acid
See, page 152

1-Bromo-anthraquinone



$= C_{14}H_7BrO_2 = 287$

FORMATION.—From potassium salt of anthraquinone-1-sulfonic acid, by treatment with bromine and acid

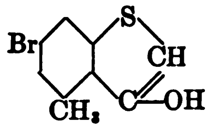
LITERATURE.—Lange, Zwischenprodukte, #3083

Dye Derived from 1-Bromo-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
873	Helindone Brown AN	I '14:— 2,831 I '20:— 16,290	1-Bromo-anthraquinone (2 mols) 1:4-Diamino-anthraquinone	V

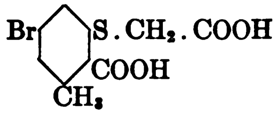
5-Bromo-2-hydroxyl-3-methyl-thionaphthene (*C. A. and English numbering*)

6-Bromo-3-hydroxyl-4-methyl-(1)-thionaphthene (*German numbering*)



$= C_9H_7BrOS = 243$

FORMATION.—4-Bromo-6-nitro-2-methyl-benzoic acid is reduced with Na_2S_2; the amino-compound diazotized, and then treated with potassium xanthogenate (potassium ethyl xanthate). The xanthogenate compound upon being treated with chloro-acetic acid forms bromo-methyl-phenyl-thioglycol-*o*-carboxylic acid



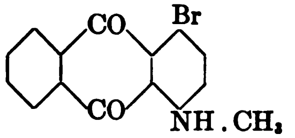
This compound upon being fused with caustic alkali, forms the carboxylic acid of 5-bromo-2-hydroxy-3-methyl-thionaphthene. The carboxylic acid decomposes, evolving CO_2, when its solution is acidified and warmed

LITERATURE.—Lange, Zwischenprodukte, #2169
Georgievics and Grandmougin, Dye Chemistry, 433, 437
Cf. Cain, Intermediate Products (2d Ed.), 158, 159

Dye Derived from 5-Bromo-2-hydroxyl-3-methyl-thionaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
910	INDIGO GROUP DYE Helindone Pink BN	I '14:— 41,699 I '20:— 17,162	5-Bromo-2-hydroxyl-3-methyl-thionaphthene (2 mols) [Oxidation]	V

1-Bromo-4-methylamino-anthraquinone



$=C_{15}H_{10}BrNO_2=316$

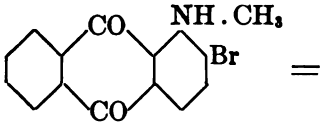
Formation.—From 1-methylamino-anthraquinone by treating its pyridine solution with bromine and warming on the water bath

Literature.—Lange, Zwischenprodukte, #3190

Dye Derived from 1-Bromo-4-methylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
856	Alizarin Astrol B	I '14:— 10,907 I '20:— 15,518	*p*-Toluidine [Sulfonation] [? Classification]	ACr

2-Bromo-1-methylamino-anthraquinone



$=C_{15}H_{10}BrNO_2=316$

Formation.—From 1-amino-2-bromo-anthraquinone by methylation with dimethyl-sulfate

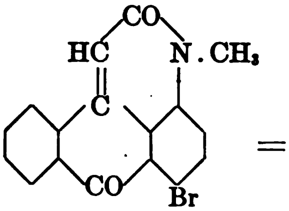
Literature.—Lange, Zwischenprodukte, #3191

Dye Derived from 2-Bromo-1-methylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
839	Algol Blue K	I '14:—150 I '20:—218	2-Bromo-1-methyl-amino-anthraquinone (2 mols)	V

4-Bromo-*N*-methyl-anthrapyridone

6-Bromo-3-methyl-3:7-*peri*-*n*aphthoquinoline-2(3):7-dione (*C.A. nomen.*)



$=C_{17}H_{10}BrNO_2=340$

FORMATION.—(1) From 1-methylamino-anthraquinone, by acetylation of amino group, and condensation to the *N*-methyl-anthrapyridone. Bromination of this latter compound in the 4 position results in 4-bromo-*N*-methyl-anthrapyridone. (2) From 4-bromo-1-methylamino-anthraquinone by acetylation and closing the ring

LITERATURE.—Lange, Zwischenprodukte, #3609
Georgievics and Grandmougin, Dye Chemistry, 464–465
Ullmann, Enzy. tech. Chemie, 1, 192

Dye Derived from 4-Bromo-*N*-methyl-anthrapyridone

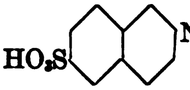
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
825	Algol Red B	I '14:— 2,399 I '20:— 4,151	2-Amino-anthraquinone	V

6-Bromo-3-methyl-3:7-*peri*-*n*aphthoquinoline-2(3):7-dione (*C. A. nomen.*)

See, 4-Bromo-*N*-methyl-anthrapyridone

Broenner's Acid

2-Naphthylamine-6-sulfonic Acid
6-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
Naphthylamine-sulfonic Acid Br.
β-Naphthylamine-β-sulfonic Acid
Amino-Schaeffer's Acid



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Imported '14:—2,316 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By heating the sodium salt of Schaeffer's Acid with concentrated ammonia in an autoclave at 180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 206
Lange, Zwischenprodukte, #2371–2376
Thorpe, Dic. Chemistry, **3**, 601

Dyes Derived from Broenner's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
172	Fast Brown 3B	I '14:— 1,477	α-Naphthol	A
174	Double Brilliant Scarlet G	I '14:—210,429 M '17:— ? M '20:— ?	β-Naphthol	A
176	Double Scarlet Extra S Scarlet 2R	I '14:— 10,182 M '17:— ? I '20:— 1,653	Nevile-Winther's Acid	A
177	Chrome Yellow D Mordant Yellow O	I '14:—129,651 M '17:— ? M '18:— 32,011 M '19:— ? I '20:— 1,389 M '20:— ?	Salicylic Acid *or* o-Cresotic Acid	M
	DISAZO DYES			
230	Cloth Red 3G, 3GA	I '14:— 251	o-Amino-azo-toluene	M
302	Hessian Brilliant Purple		Diamino-stilbene-disulfonic Acid Broenner's Acid (2 mols)	D

Dyes Derived from Broenner's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
316	Brilliant Congo G		Benzidine Amino-R Acid	D
357	Dianol Red B		Dichloro-benzidine Broenner's Acid (2 mols)	D
365	Benzo Purpurin B	I '14:— 21,090 M '17:— ? M '18:— ? M '19:— ?	Tolidine Broenner's Acid (2 mols)	D
366	Diamine Red B Delta Purpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	Tolidine 2-Naphthylamine-7-sulfonic Acid	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Tolidine Naphthionic Acid	D
370	Brilliant Congo R	I '14:— 19,133 I '20:— 11,129	Tolidine Amino-R Acid	D

C Acid

1:5-Dihydroxy-naphthalene-2-sulfonic Acid

2-Naphthol-4:8-disulfonic Acid

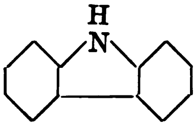
2-Naphthylamine-4:8-disulfonic Acid

(*These intermediates not considered herein*)

Carbazole

Dibenzo-pyrrole

Diphenylene-imide



$=C_{12}H_9N=167$

STATISTICS.—Imported '14:—very small
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By extraction from coal-tar or crude anthracene

LITERATURE.—Ullmann, Enzy. tech. Chemie, **3**, 274
Lange, Zwischenprodukte, page 308

Dyes Derived from Carbazole

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
748	Hydron Blue	I '14:—296,723 I '20:— 19,210 M '20:— ?	*p*-Nitroso-phenol [$S+Na_2S$]	V

Carbolic Acid

See, Phenol

Carbonyl Chloride

See, Phosgene

2-Carboxy-5-chloro-phenyl-thioglycolic Acid

See, 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

***N*-(Carboxy-methyl)-anthranilic Acid** (*C. A. nomen.*)

See, Phenyl-glycine-*o*-carboxylic Acid

2-(Carboxy-methyl-mercapto)-4-chloro-benzoic Acid (*C. A. nomen.*)

See, 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

Cassella's Acid

See, 2-Naphthol-7-sulfonic Acid

Cassella's Acid F

See, 2-Naphthylamine-7-sulfonic Acid

Chi Acid

See, Anthraquinone-1: 8-disulfonic Acid

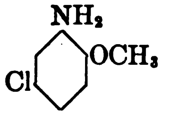
Chicago Acid

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

3-Chloro-aniline-2-sulfonic Acid

See, 2-Amino-6-chloro-benzene-sulfonic Acid

5-Chloro-*o*-anisidine (*NH_2=1*)



$= C_7H_8ClNO = 157.5$

FORMATION.—1: 4-Dichloro-3-nitro-benzene is boiled with caustic potash and methyl alcohol and the resulting chloro-nitro-anisol is reduced with iron and acetic acid

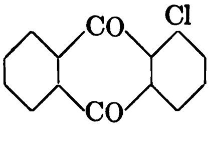
LITERATURE.—J. Soc. Chem. Ind. **21**, 610 (1902)
U. S. Pat. 695,812
Lange, Zwischenprodukte, #1034

Dye Derived from 5-Chloro-*o*-anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
97	MONOAZO DYE Chloranisidine Scarlet		β-Naphthol	MF

1-Chloro-anthraquinone (*C. A. nomen.*)

α-Chloro-anthraquinone



$= C_{14}H_7ClO_2 = 242.5$

FORMATION.—From potassium anthraquinone-1-sulfonate by treatment at 100° with chlorine and dilute hydrochloric acid

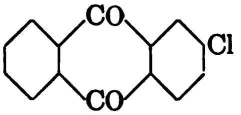
LITERATURE.—Lange, Zwischenprodukte, #3081, 3083, 3086

Dye Derived from 1-Chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
834	Algol Gray B	I '14:— 4,192 I '20:— 890	1-Amino-anthraquinone [Nitration, Reduction]	V

2-Chloro-anthraquinone (*C. A. nomen.*)

β-Chloro-anthraquinone



$=C_{14}H_7ClO_2=242.5$

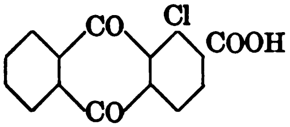
FORMATION.—(1) From sodium anthraquinone-2-sulfonate in aqueous solution, by adding hydrochloric acid, and by passing in chlorine until all the 2-chloro-anthraquinone is precipitated out. (2) From phthalic anhydride and chloro-benzene by first condensing in presence of $AlCl_3$ to chloro-benzoyl-benzoic acid, and then by warming with sulfuric acid to 2-chloro-anthraquinone

LITERATURE.—Lange, Zwischenprodukte, 3082, 3083
Ullmann, Enzy. tech. Chemie, **1**, 472

Dyes Derived from 2-Chloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
824	Algol Orange R	I '14:— 51 I '20:— 406	1-Amino-anthraquinone	V
828	Indanthrene Bordeaux B	I '20:—2,741	2-Chloro-anthraquinone (2 mols) 1:5-Diamino-anthraquinone	V
870	Algol Corinth R	I '29:— 134	1-Amino-anthraquinone [Nitration, Reduction] Benzoyl chloride	V

1-Chloro-anthraquinone-2-carboxylic Acid



$=C_{15}H_7ClO_4=286.5$

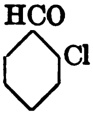
Formation.—2-Methyl-1-nitro-anthraquinone is treated with chlorine in nitro-benzene solution, whereby the nitro group is substituted by chlorine and the methyl group oxidized, thus forming 1-chloro-anthraquinone-2-carboxylic acid

Literature.—Lange, Zwischenprodukte, #3171
Ullmann, Enzy tech. Chemie, 1, 484

Dye Derived from 1-Chloro-anthraquinone-2-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
831	Indanthrene Red BN	I '14:—6,056 I '20:—4,766	β-Naphthylamine	V

o-Chloro-benzaldehyde



$=C_7H_5ClO=140.5$

Statistics.—Manufactured '20:— ?

Formation.—From o-chloro-benzyl alcohol by oxidation with nitric acid in a sulphuric acid solution at about 40° C.

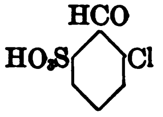
Literature.—J. Soc. Chem. Ind. 18, 576 (1899)
Lange, Zwischenprodukte, #179–184

Dyes Derived from *o*-Chloro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYLMETHANE-DYES			
496	Setoglaucine	I ’20:— 1,102	Dimethyl-aniline (2 mols) [Oxidation]	B
500	Setocyanine O	I ’14:— 923 I ’20:— 1,102	Ethyl-*o*-toluidine (2 mols) [Oxidation]	B
503	Night Green A Neptune Green Brilliant Milling Green B	I ’14:— 40,868 M ’19:— ? I ’20:— 10,940 M ’20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
551	Eriochrome Azurol B	I ’14:— 21,060 I ’20:— 7,275	*o*-Cresotic acid (2 mols) [Oxidation]	ACr

2-Chloro-benzaldehyde-6-sulfonic Acid

3-Chloro-2-formyl-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_7H_5ClO_4S = 220.5$

FORMATION.—(1) 1:3-Dichloro-2-benzaldehyde is treated with one mol of sodium sulfite under pressure. (2) 3-Chloro-2-toluene-1-sulfonic acid is oxidized with manganese dioxide and sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #710

Dye Derived from 2-Chloro-benzaldehyde-6-sulfonic Acid

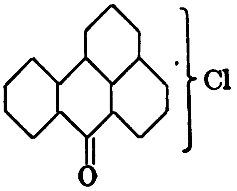
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYLMETHANE DYE			
554	Chrome Azurol S	I ’14:— 2,469 I ’20:— 551	*o*-Cresotic Acid (2 mols) [Oxidation]	ACr

?-Chloro-7-*meso*-benzanthren-7-one (*C. A. nomen.*)

See, Chloro-benzanthrone

Chloro-benzanthrone

?-Chloro-7-*meso*-benzanthren-7-one (*C. A. nomen.*)



$= C_{17}H_9ClO = 264.5$

Statistics.—Manufactured '19:— ?

Formation.—From benzanthrone in acetic acid solution by treatment with chlorine

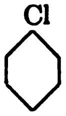
Literature.—Addition #6719 to French Patent 349,531 of Oct. 1,1906

Dyes Derived from Chloro-benzanthrone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
766	Indanthrene Violet R	I '14:— 1,590 M '19:— ? I '20:— 941	Chloro-benzanthrone (2 mols)	V
767	Indanthrene Violet 2R	I '14:— 68,419 I '20:— 40,782 M '20:— ?	Chloro-benzanthrone (2 mols) [Dichlorination] [*or* Indanthrene Violet R, chlorinated]	V
768	Indanthrene Violet B	I'20:—84,165(?)	Chloro-benzanthrone (2 mols) [Dibromination] [*or* Indanthrene Violet R, brominated]	V

Chloro-benzene (*C. A. nomen.*)

Monochlor-benzene



$=C_6H_5Cl=112.5$

STATISTICS.—Manufactured 1917:—24,624,099 lbs.
Manufactured 1918:—20,530,639 lbs.
Manufactured 1919:— 4,116,666 lbs.
Manufactured 1920:— 4,829,142 lbs.

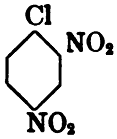
FORMATION.—By passing chlorine through benzene in the presence of a catalyst (iron) and at a relatively low temperature

LITERATURE.—Cain, Intermediate Products (2d Ed.), 6–11
Lange, Zwischenprodukte, #2

Uses.—For technical preparation of *o*- *and* *p*-chloro-nitro-benzene, chloro-dinitro-benzene, *o*-amino-phenol-*p*-sulfonic acid and many other intermediates

1-Chloro-2:4-dinitro-benzene (*C. A. nomen.*)

2:4-Dinitro-chloro-benzene



$=C_6H_3ClN_2O_4=202.5$

STATISTICS.—Manufactured 1917:—6,078,637 lbs.
Manufactured 1918:— ?
Manufactured 1919:—4,428,730 lbs.
Manufactured 1920:—5,947,791 lbs.

FORMATION.—From chloro-benzene by dinitration with mixed nitric and sulphuric acids

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14
Lange, Zwischenprodukte, #723

Dyes Derived from 1-Chloro-2:4-dinitro-benzene

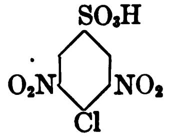
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
724	Immedial Black	I '14:— 54,696 M '18:— ?	*p*-Amino-phenol [S+Na_2S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	*p*-Amino-phenol [NaOH; S+Na_2S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	*p*-Amino-phenol [Alcohol; S+Na_2S]	S
727	Auronal Black B		*p*-Phenylene-diamine [Glycerol; S+Na_2S]	S
738	Cotton Black		Sulfanilic or Metanilic acid [S+Na_2S]	S

1-Chloro-2:6-dinitro-benzene-4-sulfonic Acid

See, 4-Chloro-3: 5-dinitro-benzene-sulfonic Acid

4-Chloro-3:5-dinitro-benzene-sulfonic Acid (*C. A. nomen.*)

I-Chloro-2: 6-dinitro-benzene-4-sulfonic Acid



$= C_6H_3ClN_2O_7S = 282.5$

FORMATION.—34 Parts of chloro-benzene are dissolved in a mixture of 72 parts of monohydrate and 30 parts of 25% oleum, by aid of heat. When cold, there is added 26 parts of 87% nitric acid which causes the temperature to rise to 40° where it is held for 2 hours. Then a further addition of oleum is made,—100 parts of 60% followed by 40 parts of potassium nitrate, and the mixture heated for several hours at 120–130°.

LITERATURE.—Lange, Zwischenprodukte, #1037

Dye Derived from 4-Chloro-3: 5-dinitro-benzene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
542	Triphenyl-methane Dye Agalma Green B	I '14:— 2,294	Hydrol Metanilic acid [Oxidation]	A

3-Chloro-2-formyl-benzene-sulfonic Acid (*C. A. nomen.*)

See, 2-Chloro-benzaldehyde-6-sulfonic Acid

Chloro-H Acid

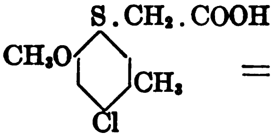
See, 1-Chloro-8-naphthol-3: 6-disulfonic Acid

(4-Chloro-6-methoxy-3-methyl-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

See, 4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

(4-Chloro-6-methoxy-3-methyl-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)



$= C_{10}H_{11}ClO_3S = 246.5$

FORMATION.—4-Chloro-6-methoxy-*m*-toluidine ($NH_2 = 1$) is dissolved in hydrochloric acid and diazotized. The diazo solution, warmed to 70°, is introduced into an alkaline solution of potassium xanthate ($C_2H_5O.CS.SK$), the condensation product extracted and saponified to the mercaptan. The mercaptan is reacted with chloro-acetic acid, forming the above thioglycolic acid

LITERATURE.—Ger. Pat. 245,544; 241,910
Frdl. 10, 507, 502
Lange, Zwischenprodukte, #1043, 688
Cf. Georgievics and Grandmougin, Dye Chemistry, 436–7

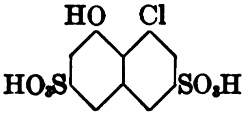
Dye Derived from 4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
920	Helindone Violet BB	I '14:— 28,607 I '20:— 16,882	4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic acid (2 mols) [Chloro-sulfonic acid]	V

1-Chloro-8-naphthol-3:6-disulfonic Acid

8-Chloro-1-*n*aphthol-3:6-disulfonic Acid (*C. A. nomen.*)

Chloro-H Acid



$= C_{10}H_7ClO_7S_2 = 338.5$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—H acid is diazotized; and the yellow diazo body is filtered off, mixed with 10 per cent hydrochloric acid, cooled to 10°, and a solution of cuprous chloride added. This product is now heated to complete the reaction, purified, and the chloro-body isolated. (Sandmeyer Reaction)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 238
Lange, Zwischenprodukte, #2451, 2671
Thorpe, Dic. Chemistry, **3**, 628

Dyes Derived from 1-Chloro-8-naphthol-3: 6-disulfonic Acid

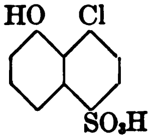
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
119	Diamine Rose	I '14:— 5,269 M '18:— ? M '19:— ? M '20:— ?	Dehydro-thio-*p*-toluidine	D
	DISAZO DYE			
418	Diamine Brilliant Blue G	I '14:— 11,592 I '20:— 51	Dianisidine 1-Chloro-8-naphthol-3: 6-disulfonic Acid (2 mols)	D

8-Chloro-1-*n*aphthol-3: 6-disulfonic Acid (*C. A. nomen.*)

See, 1-Chloro-8-naphthol-3: 6-disulfonic Acid

1-Chloro-8-naphthol-4-sulfonic Acid

8-Chloro-1-*n*aphthol-5-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_7ClO_4S = 258.5$

FORMATION.—1-Chloro-naphthalene-4-sulfonic acid is nitrated and reduced, forming 1-chloro-8-naphthylamine-4-sulfonic acid; which is diazotized and added slowly to a boiling hot solution of 10 per cent sulfuric acid and the boiling continued until the nitrogen evolution ceases

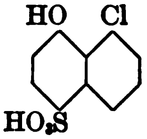
LITERATURE.—Eng. Pat., 12085 of 1898
Cf. Lange, Zwischenprodukte, #2451

Dye Derived from 1-Chloro-8-naphthol-4-sulfonic acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
417	DISAZO DYE Chlorazol Blue R	I '14:— 10,151	Dianisidine 1-Chloro-8-naphthol-5-sulfonic Acid (2 mols)	D

1-Chloro-8-naphthol-5-sulfonic Acid

8-Chloro-1-*n*aphthol-4-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_7ClO_4S = 258.5$

FORMATION.—1-Chloro-naphthalene-5-sulfonic acid is nitrated and reduced, forming 1-chloro-8-naphthylamine-5-sulfonic acid; which is diazotized and added slowly to a boiling hot solution of 10 per cent sulfuric acid, and the boiling continued until the evolution of nitrogen ceases.

LITERATURE.—Eng. Pat., 12085 of 1898
Cf. Lange, Zwischenprodukte, #2451

Dye Derived from 1-Chloro-8-naphthol-5-sulfonic acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
417	DISAZO DYE Chlorazol Blue 3G	I '14:— 10,151	Dianisidine 1-Chloro-8-naphthol-5-sulfonic Acid (2 mols)	D

8-Chloro-1-*n*aphthol-4-sulfonic Acid (*C. A. nomen.*)

See, 1-Chloro-8-naphthol-5-sulfonic Acid

8-Chloro-1-*naphthol*-5-sulfonic Acid (*C. A. nomen.*)

See, 1-Chloro-8-naphthol-4-sulfonic Acid

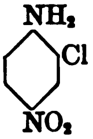
1-Chloro-3-nitro-6-aniline

See, 2-Chloro-4-nitro-aniline (*C. A. nomen.*)

2-Chloro-4-nitro-aniline (*C. A. nomen.*)

o-Chloro-*p*-nitro-aniline

1-Chloro-3-nitro-6-aniline



$=C_6H_5ClN_2O_2=172.5$

Formation.—*p*-Nitro-aniline is dissolved in concentrated hydrochloric acid or in sulfuric acid, ice added to cool under 0°, and chlorine is conducted into the solution under 0°, until the proper increase in weight has taken place

Literature.—Lange, Zwischenprodukte, #724

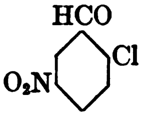
Dyes Derived from 2-Chloro-4-nitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Frisazo Dyes			
467	Diphenyl Green G	I '20:— 2,205	Benzidine Phenol H Acid	D
468	Diphenyl Green 3G		Benzidine Salicylic Acid H Acid	D

***o*-Chloro-*p*-nitro-aniline**

See, 2-Chloro-4-nitro-aniline (*C. A. nomen.*)

2-Chloro-5-nitro-benzaldehyde



$=C_7H_4ClNO_3=185.5$

FORMATION.—*o*-Chloro-benzaldehyde is dissolved in sulfuric acid, and nitrated cold with mixed acid

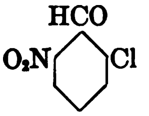
LITERATURE.—Beil., III, 16

Dye Derived from 2-Chloro-5-nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TREPHENYL-METHANE DYE			
552	Chromal Blue G	I '14:— 1,335	*o*-Cresotic Acid (2 mols) [Oxidation]	M

2-Chloro-6-nitro-benzaldehyde (*C. A. nomen.*)

o-Chloro-*o*-nitro-benzaldehyde



$=C_7H_4ClNO_3=185.5$

FORMATION.—This can be prepared from 2-chloro-6-nitro-benzyl bromide by action of strong nitric acid, or from 2-chloro-6-nitro-benzyl alcohol by oxidation

LITERATURE.—Lange, Zwischenprodukte, #699
Beil. III,, spl. 11

Dye Derived from 2-Chloro-6-nitro-benzaldehyde

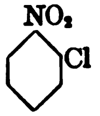
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
887	Brilliant Indigo BASF/4G	I '20:— 1,207	2-Chloro-6-nitro-benzaldehyde (2 mols) [Acetone; Bromination]	V

o-Chloro-*o*-nitro-benzaldehyde

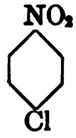
See, 2-Chloro-6-nitro-benzaldehyde (*C. A. nomen.*)

o- and p-Chloro-nitro-*b*enzenes (*C. A. nomen.*)

o- and p-Nitro-chloro-benzenes



and



$= C_6H_4ClNO_2 = 157.5$

STATISTICS.—	*Mixed*	*orth.*	*para*
Manufactured 1917:—	602,192 lbs.		
Manufactured 1918:—	?		
Manufactured 1919:—	2,520,991 lbs.		
Manufactured 1920:—		349,386 lbs.	959,405 lbs.

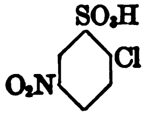
FORMATION.—Chloro-benzene, upon being nitrated, gives a mixture o about 30 per cent of *o*-chloro-nitro-benzene and about 70 per cent of *p*-chloro-nitro-benzene. The separation is carried out by alternate crystallization (of the *p*-compound) and fractional distillation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 11–13
Lange, Zwischenprodukte, #193, 194

USES.—*o*-Chloro-nitro-benzene is employed for preparation of *o*-nitro-anisole, which in turn leads to *o*-anisidine and dianisidine. It is also used for 4-chloro-3-nitro-benzene-sulfonic acid

p-Chloro-nitro-benzene is employed for preparation of substituted diphenylamines (Sulfur Dyes), and for 2-chloro-5-nitro-benzene-sulfonic acid

2-Chloro-5-nitro-*b*enzene-sulfonic Acid



$= C_6H_4ClNO_5S = 237.5$

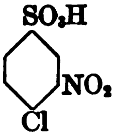
STATISTICS.—Manufactured 1920:— ?

FORMATION.—By sulfonation of *p*-chloro-nitro-benzene with 10–12 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14

USES.—For preparation of 4-nitro-aniline-2-sulfonic acid (*p*-nitro-aniline-*o*-sulfonic acid)

4-Chloro-3-nitro-benzene-sulfonic Acid



$= C_6H_4ClNO_5S = 237.5$

FORMATION.—By sulfonation of *o*-chloro-nitro-benzene with 5 parts of 30 per cent oleum

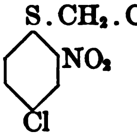
LITERATURE.—Cain, Intermediate Products (2d Ed.), 13

USES.—For preparation of aniline-2: 5-disulfonic acid

(4-Chloro-2-nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)
See 4-Chloro-2-nitro-phenyl-thioglycolic Acid

4-Chloro-2-nitro-phenyl-thioglycolic Acid

(4-Chloro-2-nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)



$= C_8H_6ClNO_4S = 247.5$

FORMATION.—(1) 4-Chloro-2-nitro-phenyl-mercaptan is reacted with chloro-acetic acid in an alkaline solution. (2) Probably also by reacting the nitro-derivative of *p*-dichloro-benzene (1: 4-dichloro-3-nitro-benzene) with thioglycolic acid

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #2171, 611, 1041, 674

Dye Derived from 4-Chloro-2-nitro-phenyl-thioglycolic Acid

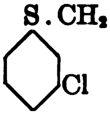
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
921	Helindone Gray BR, 2B	I '14:—470 I '20:—508	4-Chloro-2-nitro-phenyl-thioglycolic acid (2 mols) [Chloro-sulfonic acid; Reduction]	V

α-Chloro-*p*-nitro-*t*oluene (*C. A. nomen.*)
See, *p*-Nitro-benzyl Chloride

(*m*-Chloro-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)
See, *m*-Chloro-phenyl-thioglycolic Acid

m-Chloro-phenyl-thioglycolic Acid

(*m*-Chloro-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)



$= C_8H_7ClO_2S = 202.5$

Formation.—*m*-Chloro-aniline is diazotized, coupled with potassium xanthate ($C_2H_5O.CS.SK$), hydrolyzed to the mercapto-derivative, and condensed with chloro-acetic acid

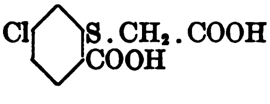
Literature.—*Cf.* Lange, Zwischenprodukte, #688

Dye Derived from *m*-Chloro-phenyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Indigo Group Dyes			
917	Helindone Red B	I '14:—100 I '20:—200	*m*-Chloro-phenyl-thioglycolic Acid (2 mols) [Oleum Condensation]	V

5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

2-Carboxy-5-chloro-phenyl-thioglycolic Acid
2-(Carboxy-methyl-mercapto)-4-chloro-*b*enzoic Acid (*C. A. nomen.*)



$= C_9H_8O_4S = 212$

Formation.—4-Chloro-anthranilic acid is diazotized, and reacted with potassium ethyl xanthate, and then with chloro-acetic acid, resulting in the formation of the chloro-phenyl-thioglycol-o-carboxy acid

Literature.—Lange, Zwischenprodukte, #2170; *cf.* #518

Dye Derived from 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE			
909	Ciba Red B		5-Chloro-phenyl-thioglycol-*o*-carboxylic acid (2 mols)	V

α-Chloro-toluene (*C. A. nomen.*)

See, Benzyl Chloride

2-Chloro-5-toluidine-4-sulfonic Acid ($CH_3 = 1$)

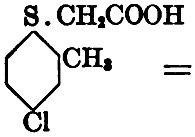
See, 2-Amino-5-chloro-*p*-*t*oluene-sulfonic Acid (*C. A. nomen* $SO_3H = 1$)

(4-Chloro-*o*-tolyl-mercapto)-acetic Acid (*C. A. nomen.*)

See, 4-Chloro-2-tolyl-thioglycolic Acid

4-Chloro-2-tolyl-thioglycolic Acid

(4-Chloro-*o*-tolyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)



$= C_9H_9ClO_2S = 216.5$

FORMATION.—4-Chloro-*o*-toluidine ($NH_2 = 1$) is diazotized, coupled with potassium xanthate ($C_2H_5O . CS . SK$), hydrolyzed to the mercapto-derivative, and condensed with chloro-acetic acid

LITERATURE.—Lange, Zwischenprodukte, #688
Cf. Geogievics and Grandmougin, Dye Chemistry, 437

Dye Derived from 4-Chloro-2-tolyl-thioglycolic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
918	INDIGO GROUP DYE Helindone Red 3B	I '14:— 27,874 I '20:— 4,385	4-Chloro-2-tolyl-thioglycolic Acid (2 mols) [Oleum Condensation] [There is some question as to the Cl- and CH_3- positions of that chloro-tolyl-thioglycolic acid used]	V

Chromogen I

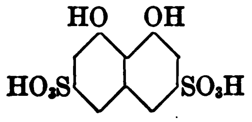
See, Chromotropic Acid

Chromotrope Acid

See, Chromotropic Acid

Chromotropic Acid

1: 8-Dihydroxy-naphthalene-3: 6-disulfonic Acid
4: 5-Dihydroxy-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)
Chromotrope Acid
Chromogen I



$= C_{10}H_8O_8S_2 = 320$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:—164,654 lbs.
Manufactured '20:—152,352 lbs.

FORMATION.—(1) From 1-Naphthol-3: 6: 8-trisulfonic acid by fusion of the sodium salt of this acid with caustic soda at 170–220°. (2) From H acid by heating with a dilute caustic soda solution in an autoclave at about 265°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 232
Lange, Zwischenprodukte, #2775, 2670

Dyes Derived from Chromotropic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
40	Chromotrope 2R	I ’14:— 5,000 M ’17:— ? M ’18:— ? M ’19:— ? M ’20:— ?	Aniline	A
57	Chromotrope 2B	I ’14:— 7,970 M ’18:— ? M ’19:— ? M ’20:— ?	*p*-Nitro-aniline	ACr
61	Victoria Violet	I ’14:— 52,365 M ’17:— ? M ’18:— ? M ’19:—105,086 I ’20:— 2,182 M ’20:— ?	*p*-Phenylene-diamine *actually from* *p*-Nitro-aniline and Reduction *or* *p*-Amino-acetanilide and Saponification	A
67	Chromotrope 6B	I ’14:— 2,818 M ’17:— ? M ’18:— ? M ’19:— 77,481 M ’20:— ?	*p*-Amino-acetanilide	A
114	Chromotrope 10B	M ’19:— ?	α-Naphthylamine	A
129	Chromazone Red A	I ’14:— 243	*p*-Amino-benzaldehyde	M
130	Chromazone Blue R		*p*-Amino-benzaldehyde Ethyl-phenyl-hydrazine *or* *p*-Amino-benzylidine-ethyl-phenyl-hydrazone	M
171	Chromotrope 8B	M ’18:— ?	Naphthionic Acid	A

Dyes Derived from Chromotropic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
292	Acid Alizarine Black I		*p*-Phenylene-diamine Salicylic Acid	M
323	Dianil Blue R	M '20:— ?	Benzidine Chromotropic Acid (2 mols)	D
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Tolidine Nevile-Winther's Acid	D
380	Dianil Blue B		Tolidine Chromotropic Acid (2 mols)	D
415	Dianil Blue G	M '19:— ? M '20:— ?	Dianisidine Chromotropic Acid (2 mols)	D
	TRISAZO DYE			
479	Dianil Black R		Benzidine Naphthionic Acid *m*-Phenylene-diamine	D
	ANTHRAQUINONE AND ALLIED DYES			
777	Chromogen I		[Oxidation on fiber]	ACr

Chrysazin

1:8-Dihydroxy-anthraquinone (*not considered herein*)

Chryseic Acid

4-Nitro-1-naphthol (*not considered herein*)

Cincholepidine

See, Lepidine

Cleve's Acid

See, 1-Naphthol-5-sulfonic Acid
See, 1-Naphthylamine-6-sulfonic Acid
See, 1-Naphthylamine-7-sulfonic Acid

Cleves α Acid

See, Laurent's Acid (1-Naphthylamine-5-sulfonic Acid)

Cleve's β Acid

See, 1-Naphthylamine-6-sulfonic Acid

Also applied to 1-Nitro-naphthalene-6-sulfonic acid

Cleve's γ Acid

1-Naphthylamine-3-sulfonic Acid (*not considered herein*)

Cleve's δ Acid

See, 1-Naphthylamine-7-sulfonic Acid

This trivial name also applied to

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

Cleve's θ Acid

See, 1-Naphthylamine-7-sulfonic Acid

This trivial name also applied to

1-Nitro-naphthalene-6-sulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

Cleve's Acids

See, 1-Naphthylamine-6-*and*-7-sulfonic Acids

Cleve's α-Nitro-naphthalene-sulfonic Acid

1-Nitro-napthalene-5-sulfonic Acid (*not considered herein*)

Cleve's γ-Nitro-naphthalene-sulfonic Acid

1-Nitro-naphthalene-3-sulfonic Acid (*not considered herein*)

Cleve's δ-Nitro-naphthalene-sulfonic Acid

1-Nitro-naphthalene-8-sulfonic Acid (*not considered herein*)

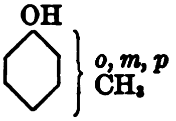
Cleve's θ-Nitro-naphthalene-sulfonic Acid

1-Nitro-naphthalene-6-sulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

Cresol

Note.—C. A. practice is to start the numbering of cresols from the OH group unless there is present a substituent of "higher order" as SO_3H. European practice is generally to start numbering with CH_3



$=C_7H_8O=108$

STATISTICS.—Imported '14:—245,835 lbs.
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—Extracted from coal tar

LITERATURE.—Lange, Zwischenprodukte, #438–452

Dye Derived from Cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
311	DISAZO DYE Orange TA	I '14:—602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Naphthionic Acid	D

2:3-Cresotic Acid (*C. A. nomen.*)

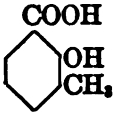
See, *o*-Cresotic Acid

o-Cresotic Acid

o-Cresotinic Acid

2:3-Cresotic Acid (*C. A. nomen.*)

o-Homo-salicylic Acid



$=C_8H_8O_3=152$

STATISTICS.—Imported '14:—very small
Manufactured '20:— ?

FORMATION.—By dissolving *o*-cresol in caustic soda, evaporating to a dry powder; then by treating this powder with carbon dioxide under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 153
Lange, Zwischenprodukte, #775

Dyes Derived from *o*-Cresotic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
177	Chrome Yellow D		Broenner's Acid	M
	DISAZO DYES			
351	Cresotine Yellow G	I '14:— 1,748 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine *o*-Cresotic Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? I '20:— 273 M '20:— ?	Tolidine 4:6-Diamino-*m*-toluene-sulfonic Acid	D
395	Cresotine Yellow R		Tolidine *o*-Cresotic acid (2 mols)	D
	TRIPHENYL-METHANE DYES			
551	Eriochrome Azurol B	I '14:— 21,060 I '20:— 7,275	*o*-Chloro-benzaldehyde [*or* other halogen] *o*-Cresotic Acid (2 mols) [Oxidation]	ACr
552	Chromal Blue G	I '14:— 1,335	2-Chloro-5-nitro-benzaldehyde *o*-Cresotic Acid (2 mols) [Oxidation]	M

Dyes Derived from *o*-Cresotic Acid (*continued*)

Schultz Number or Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
553	Eriochrome Cyanine R	I '14:— 2,249 I '20:— 2,205	Benzaldehyde-*o*-sulfonic Acid *o*-Cresotic Acid (2 mols) [Oxidation]	ACr
554	Chrome Azurol S	I '14:— 2,469 I '20:— 551	2-Chloro-benzaldehyde-6-sulfonic Acid *o*-Cresotic Acid (2 mols) [Oxidation]	ACr

***o*-Cresotinic Acid**

See, o-Cresotic Acid

Croceine Acid

2-Naphthol-8-sulfonic Acid (*C. A. nomen.*)

Bayer's Acid

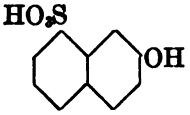
β-Naphthol-sulfonic Acid B (*of Schultz*)

β-Naphthol-α-sulfonic Acid (*of Bayer & Co.'s Patents*)

Croceine Sulfonic Acid

o-Acid (*of Claus and Voltz*) [1]

Rumpff Acid



$= C_{16}H_8O_4S = 224$

STATISTICS.—Manufactured 1919:— ?
Manufactured 1920:— ?

FORMATION.—β-Naphthol is sulfonated at a low temperature, forming mostly croceine acid, but accompanied by some Schaeffer's acid. They are generally separated by crystallization of their salts

LITERATURE.—Cain, Intermediate Products (2d Ed.), 225
Lange, Zwischenprodukte, #2435–2439
Thorpe, Dic. Chemistry, 3, 625

---

[1] Claus and Voltz incorrectly assigned to this acid the constitution, 2-naphthol-3-sulfonic acid.

Dyes Derived from Croceine Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
167	Croceine Scarlet 3 BX	I '14:— 3,101 M '17:— ? M '18:— ? M '19:— ? I '20:— 650 M '20:— ?	Naphthionic Acid	A
	DISAZO DYES			
249	Croceine Scarlet 3B	I '14:— 9,613	Amino-azo-benzene-sulfonic Acid	A
251	Croceine Scarlet O	I '20:— 100	Amino-azo-benzene-disulfonic Acid	A
255	Croceine Scarlet 8B Ponceau 6 RB	I '14:— 2,379 I '20:— 154	Amino-azo-toluene-sulfonic Acid	A
259	Ponceau 10 RB	I '14:— 201	Sulfanilic Acid *o*-Anisidine	A
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Benzidine Naphthionic Acid	D
320	Bordeaux	I '14:— 1,335 M '18:— ? M '19:— ? M '20:— ?	Benzidine Croceine Acid (2 mols)	D
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Benzidine 1-Naphthol-4:8-disulfonic Acid	D
324	Chicago Blue 4R	I '14:— 1,199	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from Croceine Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
384	Chicago Blue 2R Diamine Blue C2R	I '14:— 23,877	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D
420	Azidine Wool Blue B		Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid	D

Croceine-sulfonic Acid
See, Croceine Acid

ψ Cumidine
See, Pseudocumidine (*C. A. nomen.*)

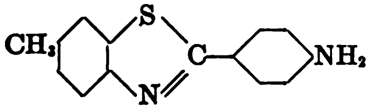
Dahl's Acid
See, 2-Naphthylamine-5-sulfonic Acid

Dahl's Acid II
See, 1-Naphthylamine-4:6-disulfonic Acid

Dahl's Acid III
See, 1-Naphthylamine-4:7-disulfonic Acid

Dahl's Acids
1-Naphthol-4:6-and-4:7-disulfonic Acids (*not considered herein*)

Dehydro-thio-*p*-toluidine
IV-Amino-5-methyl-2-phenyl-thiazol
Amino-benzenyl-*o*-amino-thio-cresol
p-Amino-phenyl-toluthiazole
1-(*p*-Amino-phenyl)-5-methyl-*b*enzothiazole (*C. A. nomen.*)



$= C_{14}H_{12}N_2S = 240$

FORMATION.—By heating together 3⅛ parts of *p*-toluidine with 1 part of sulfur, gradually raising the temperature to the boiling point, and finally fractionally distilling off the dehydro-thio-*p*-toluidine in a vacuum

LITERATURE.—Cain, Intermediates (2d Ed.), 77
Lange, Zwischenprodukte, #2219–2223

Dyes Derived from Dehydro-thio-*p*-toluidine

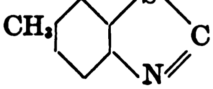
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
117	Erica 2GN	I '14:— 1,171 M '19:— ? I '20:— 337	1-Naphthol-3: 8-disulfonic Acid	D
118	Geranine Brilliant Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	1-Naphthol-4: 8-disulfonic Acid *or* 1-Naphthol-3-sulfonic Acid *or* 1: 8-Dihydroxynaphthalene-4-sulfonic Acid	D
119	Diamine Rose	I '14:— 5,269 M '18:— ? M '19:— ? M '20:— ?	1-Chloro-8-naphthol-3: 6-disulfonic Acid	D
	THIOBENZENYL DYES			
614	Chromine G	I '14:— 1,001	[Sulfur, Methylation, Sulfonation]	D
618	Thioflavine T	I '14:— 35,224 I '20:— 5,807	[Methylation]	B

Dehydro-thio-*p*-toluidine-sulfonic Acid

IV-Amino-5-methyl-2-phenyl-thiazol-sulfonic Acid

DTS (*abbreviation for above in compounds, less NH_2*)

1-(4-Amino-?-sulfo-phenyl)-5-methyl-*b*enzothiazole (*C. A. nomen.*)



$.C_6H_3(SO_3H).NH_2 \quad = C_{14}H_{12}N_2O_3S_2 = 320$

Statistics.—Manufactured '19:— ?
Manufactured '20:—51,961 lbs.

Formation.—By sulfonation of the "primuline melt" (from *p*-toluidine and sulfur), and purification from the primuline-sulfonic acid also formed

Literature.—Cain, Intermediate Products (2d Ed.), 78
Lange, Zwischenprodukte, #2237
Ullmann, Enzy. tech. Chemie, 3, 677

Dyes Derived from Dehydro-thio-*p*-toluidine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
16	Curcuphenine		Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (4 mols)	D
17	Chlorophenine		Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Reduction]	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) Dinitro-dibenzyl-disulfonic Acid *or* Dinitro-stilbene-disulfonic Acid	D
	MONOAZO DYES			
51	Nitrophenine Thiazol Yellow R	I '14:— 423 M '20:— ?	*p*-Nitro-aniline	D
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	*m*-Phenylene-diamine	D
193	Clayton Cloth Red Stanley Red	I '14:— 100 M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	A

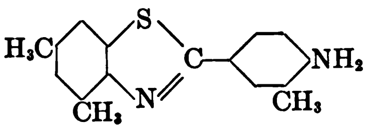
Dyes Derived from Dehydro-thio-*p*-toluidine-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
194	Rosophenine 10B Thiazine Red R	I '14:— 3,077 M '19:— ? M '20:— ?	Nevile-Winther's Acid	D
196	Titan Red	I '14:— 886 M '19:— ? M '20:— ?	Schaeffer's Acid	D
198	Clayton Yellow Thiazol Yellow Mimosa C	I '14:— 29,879 M '18:— ? M '19:— ? I '20:— 11,182 M '20:— ?	Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols)	D
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 I '20:— 125 M '20:— ?	Salicylic Acid	D
	DISAZO DYE			
209	Terracotta FC	I '14:— 551	Naphthionic Acid *m*-Phenylene-diamine	D
350	Alkali Yellow R		Benzidine Salicylic Acid	D
	THIOBENZENYL DYE			
617	Chloramine Yellow Diamine Fast Yellow Columbia Yellow	I '14:—180,497 M '17:— ? M '18:—123,816 M '19:— 54,077 I '20:— 4,810 M '20:—100,248	[Oxidation]	D

Dehydro-thio-*m*-xylidine

IV-Amino-2-phenyl-5:7:III-trimethyl-thiazol

1-(4-Amino-*m*-tolyl-)-3:5-dimethyl-benzothiazole (*C. A. nomen.*)



$= C_{16}H_{16}N_2S = 268$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From *m*-xylidine and sulfur by heating to the boiling point until there is no further evolution of hydrogen sulfide; and by separating by distillation from the excess *m*-xylidine, and by solution in 30% hydrochloric acid from the *iso*-dehydro-thio-*m*-xylidine

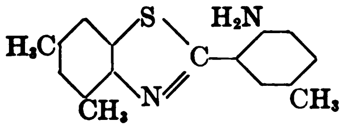
LITERATURE.—Lange, Zwischenprodukte, #2232
Cain, Intermediate Products (2d Ed.), 80
Anschütz and Schultz, Ber., **22**, 582 (1889)
Paul, Zeitsch. angew. Chem., **9**, 679 (1896)

Dyes Derived from Dehydro-thio-*m*-xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
120	Salmon Red	M '20:— ?	Amino-R Acid	D
121	Erica B	I '14:— 5,349 I. '20:— 2,393 M '19:— ?	1-Naphthol-3:8-disulfonic Acid	D
122	Erica G	I '14:— 2,370 I '20:— 1,142 M '18:— ?	G Acid	D

iso-Dehydro-thio-*m*-xylidine

1-(6-Amino-*m*-tolyl)-3:5-dimethyl-*b*enzothiazole (*C. A. nomen.*)



$=C_{16}H_{16}N_2S=268$

FORMATION.—As a by-product in the manufacture of dehydro-thio-*m* xylidine (see dehydro-thio-*m*-xylidine)

LITERATURE.—See dehydro-thio-*m*-xylidine
Heumann, Anilinefarben, **4**, 752

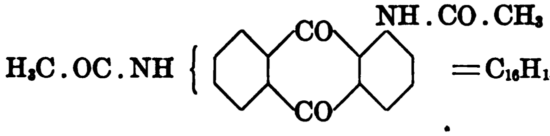
Dyes Derived from *iso*-Dehydro-thio-*m*-xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
123	Emine Red		Schaeffer's Acid	A

Delta Acid

See, 1-Naphthylamine-4:8-disulfonic Acid
and 2-Naphthylamine-7-sulfonic Acid

1:6-(*or* 1:7-)Diacetamido-anthraquinone


$=C_{16}H_{14}N_2O_4=322$

FORMATION.—The above intermediate is obtained by reduction and acetylation of the easily soluble dinitro-anthraquinone, prepared from the crude dinitration product of anthraquinone.

LITERATURE.—Ger. Pat. 72,685, 198,048
Lange, Zwischenprodukte, #3218

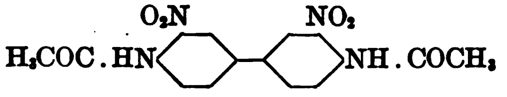
Dyes Derived from 1:6-(*or* 1:7-)Diacetamido-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
812	Indanthrene Orange RT	I '14:— 2,103 I '20:— 382	2-Acetamido-anthraquinone	V
813	Indanthrene Copper R	I '14:— 1,268	1-Acetamido-anthraquinone	V

Diacetyl-*o*: *o'*-dinitro-benzidine

Diacetyl-3: 3'-dinitro-benzidine (*numbering from point of attachment*)

2: 2'-Dinitro-*p*: *p'*-biacetanilide (*C. A. nomen. with numbering from "chief function" or the acetamido groups*)



$$H_3COC.HN\text{—}(O_2N)C_6H_3\text{—}C_6H_3(NO_2)\text{—}NH.COCH_3 = C_{16}H_{14}N_4O_6 = 358$$

Formation.—Benzidine is acetylated by boiling with acetic acid under a reflux, and the resulting diacetyl-compound is nitrated by dissolving in 10 parts of nitric acid (sp. gr. 1.48) with cooling

Literature.—Beil, IV, 964
Brunner and Witt, Ber. **20**, 1024 (1887)

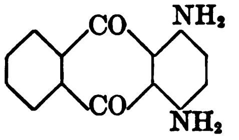
Dye Derived from Diacetyl-*o*: *o'*-dinitro-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
715	Sulfur Dye Thiocatechine		[Sulfur and Na_2S]	S

***p*-(2: 4-Diamino-anilino)-phenol** (*C. A. nomen.*)

See, 2: 4-Diamino-4'-hydroxy-diphenylamine

1: 4-Diamino-anthraquinone



$= C_{14}H_{10}N_2O_2 = 238$

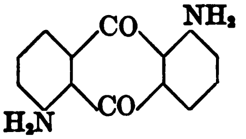
Formation.—From 1-nitro-4-amino-anthraquinone (derived from 1-amino-anthraquinone) by reduction with alkaline sodium sulfide

Literature.—Lange, Zwischenprodukte, #3221, 3232, 3233
Ullmann, Enzy. tech. Chemie, **1**, 477

Dyes Derived from 1:4-Diamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
816	Algol Red 5G	I '14.— 1,338 I '20:— 51	Benzoyl chloride (2 mols)	V
873	Helindone Brown AN	I '14:— 2,831 I '20:— 16,290	1-Bromo-anthraquinone (2 mols)	V

1:5-Diamino-anthraquinone



$$= C_{14}H_{10}N_2O_2 = 238$$

FORMATION.—(1) From 1:5-dinitro-anthraquinone by reduction. (2) From 1:5-anthraquinone-disulfonic acid by treatment with ammonia

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 477
Lange, Zwischenprodukte, #3109, 3115, 3222, 3265

Dyes Derived from 1:5-Diamino-anthraquinone

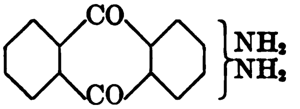
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
817	Algol Yellow R	I '14:— 4,887 I '20:— 2,299 M '20:— ?	Benzoyl chloride (2 mols)	V
819	Algol Red R	I '14:— 2,322 I '20:— 7,335	Benzoyl chloride (2 mols) [Oxidation]	V
828	Indanthrene Bordeaux B	I '20:— 2,741	2-Chloro-anthraquinone (2 mols)	V

Dyes Derived from 1:5-Diamino-anthraquinone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
845	Indanthrene Maroon R	I '20:— 46	1:5-Diamino-anthraquinone (2 mols)	V
848	Indanthrene Gray B	I '14:— 401 I '20:— 2,639	1:5-Diamino-anthraquinone (2 mols ?)	V

Diamino-anthraquinones

(*Probably a mixture of the 1:4, 1:5 and 1:8*)

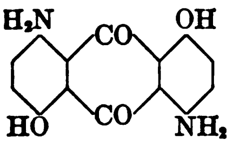


$=C_{14}H_{10}N_2O_2=238$

Dyes Derived from Diamino-anthraquinones

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
836	Helindone Brown 3GN	I '20:— 15,238	2-Anthraquinonyl-urea chloride (2 mols)	V

4:8-Diamino-anthrarufin



$=C_{14}H_{16}N_2O_4=270$

FORMATION.—1:5-Dinitro-anthraquinone is partly reduced, giving 1:5-dihydroxyamino-anthraquinone, which is then transformed into diamino-anthrarufin

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 275

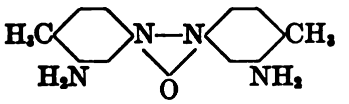
Dyes Derived from 4:8-Diamino-anthrarufin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
820	Algol Brilliant Violet R	I '14:— 12,784 I '20:— 7,856	Diamino-anthrarufin (2 mols) [Succinic Acid]	V
821	Algol Brilliant Violet 2B	I '14:— 3,893 I '20:— 827	Benzoyl chloride (2 mols)	V

Diamino-azoxy-toluene

p-Azoxy-*o*-toluidine

5:5'-Azoxy-bis-*o*-toluidine (*C. A. nomen.*)



$=C_{14}H_{16}N_4O=256$

FORMATION.—From 5-nitro-*o*-toluidine ($NH_2=1$) by reduction, using zinc dust and caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 99
Lange, Zwischenprodukte, #1792

Dyes Derived from Diamino-azoxy-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
483	St. Denis Red Rosophenine 4B	I '14:— 1,496 I '20:— 550	Nevile-Winther's Acid (2 mols)	D
484	Milling Scarlet B,S		Nevile-Winther's Acid R Acid	A

4:6-Diamino-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

See, *m*-Phenylene-diamine-disulfonic Acid

2:5-Diamino-benzene-sulfonic Acid (*C. A. nomen.*)

See, *p*-Phenylene-diamine-sulfonic Acid

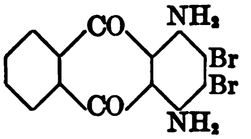
6:6′-Diamino-*m*:*m*′-bi(benzene-sulfonic) Acid (*C. A. nomen.*)

See, Benzidine-disulfonic Acid

2:2′-Diamino-5:5′-bi-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

See, *o*-Tolidine-disulfonic Acid

1:4-Diamino-2:3-dibromo-anthraquinone



$= C_{14}H_8Br_2N_2O_2 \underset{\cdot}{=} 396$

FORMATION.—By brominating 1:4-diamino-anthraquinone, probably in nitro-benzene solution. (The corresponding chloro-compound is made by action of sulfuryl chloride)

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #3334
Barnett, Anthracene and Anthraquinone, 170–175, 190–231

Dyes Derived from 1:4-Diamino-2:3-dibromo-anthraquinone

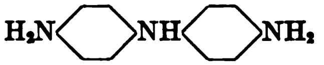
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYE			
847	Algol Green B	I '14:— 2,796 I '20:— 527	1:4-Diamino-2:3-dibromo-anthraquinone (2 mols)	V

2:7-Diamino-9-dioxide-?:?-dibenzothiophene-disulfonic Acid (*C. A. nomen.*)

See, Benzidine-sulfon-disulfonic Acid

p:p'-Diamino-diphenylamine

p:p'-Imino-bisaniline (*C. A. nomen.*)



$=C_{12}H_{13}N_3=199$

STATISTICS.—Imported '14:—very small amount

FORMATION.—Equal molecules of aniline and p-phenylene-diamine are oxidized at 0° by means of potassium permanganate to a blue indamine, which is then reduced with zinc dust and hydrochloric acid

LITERATURE.—Nietzke, Ber., **16**, 474
Lange, Zwischenprodukte, #1636, 1753

Dye Derived from p:p'-Diamino-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANILINE BLACK GROUP			
923	Furreine DB	I '14:— 54,005 M '19:— ? I '20:— 1,600 M '20:—168,459	p:p'-Diamino-diphenylamine (x mols) (?) [Oxidation on hair]	Fur

4:4'-Diamino-diphenyl-3:3'-disulfonic Acid

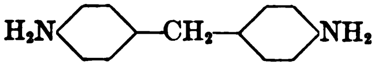
See, Benzidine-disulfonic Acid

p:p'-Diamino-diphenylethylene-o:o'-disulfonic Acid

See, Diamino-stilbene-disulfonic Acid

p:p'-Diamino-diphenyl-methane

p:p'-Methylene-bisaniline (*C. A. nomen.*)



$=C_{13}H_{14}N_2=198$

STATISTICS.—Manufactured '20:— ?

FORMATION.—50 parts of anhydro-formaldehyde-aniline (from equal parts of aniline and 40 per cent formaldehyde), 100 parts of aniline and 70 parts of aniline salt are heated together on a water bath, condensing to the *p*: *p'*-diamino-diphenyl-methane

LITERATURE.—Schultz, Farbstofftabellen (1914), #511
Lange, Zwischenprodukte, #1297

Dyes Derived from *p*: *p'*-Diamino-diphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
298	Milling Red R		R Acid (2 mols)	A
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14 — 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline Nitro-benzene	B
540	Pacific Blue		Aniline *o*-Toluidine *p*-Toluidine [Sulfonation] *or* [*p*-Rosaniline+Benzoic acid and sulfonation]	D

p: *p'*-Diamino-diphenyl-sulfide

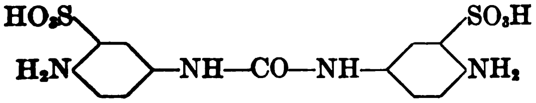
See, Thioaniline

4: 4'-Diamino-diphenyl-2: 2'-sulfon-disulfonic Acid

See, Benzidine-sulfon-disulfonic Acid

Diamino-diphenyl-urea-disulfonic Acid

5.5'-Ureido-bis(2-amino-*b*enzene-sulfonic Acid) (*C. A. nomen.*)



$=C_{13}H_{14}N_4O_7S_2=402$

FORMATION.—24 Parts of 4-nitro-amino-benzene-3-sulfonic acid is dissolved in water containing 5.5 parts of soda ash, and phosgene conducted in until the reaction is completed, as indicated by test not diazotizing. The dinitro-body is now reduced with iron

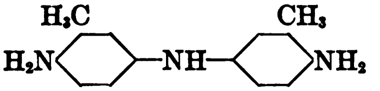
LITERATURE.—Lange, Zwischenprodukte, #1823.

Dye Derived from Diamino-diphenyl-urea-disulfonic acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
297	DISAZO DYE Benzo Fast Pink 2BL	I '14:— 3,252 I '14:— 1,226	Gamma acid (2 mols)	D

p:*p*′-Diamino-ditolyl-amine

4:4′-Imino-bis-*o*-*t*oluidine (*C A. nomen.* $NH_2=1$)



$=C_{14}H_{17}N_2=227$

FORMATION.—By semidine rearrangement of amino-azo-*o*-toluene whereby the hydrochloride of amino-azo-*o*-toluene is dissolved in sulfurous acid solution and reduced with zinc dust, the product poured into 50 per cent sulfuric acid, boiled and crystallized

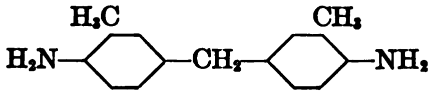
LITERATURE.—Barber and Sisley, Sur un noveau mode de formation de la *p*-diamino-diphenylamine
Bull. Soc. Chim. [3] **33**, 1232–34 (1905)
Chem. Centr. **1906** [1], 232

Dye Derived from *p*:*p*′-Diamino-ditolyl-amine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
295	DISAZO DYE Diphenyl Fast Black	I '14:— 882	Gamma Acid *m*-Tolylene-diamine	D

p:*p*′-Diamino-ditolyl-methane

4:4′-Methylene-bis-*o*-toluidine (*C. A. nomen.*)



$=C_{15}H_{18}N_2=226$

Formation.—100 parts of anhydro-formaldehyde-aniline + 250 parts of *o*-toluidine hydrochloride + 500 parts of *o*-toluidine are warmed together on a water bath; and after 12 hours the mass is made alkaline and the aniline is distilled off with the aid of steam. (The anhydro-formaldehyde-aniline is only used as a carrier for the formaldehyde)

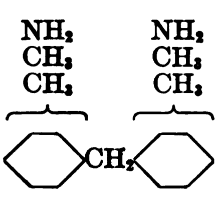
Literature.—Lange, Zwischenprodukte, #1315, 1316

Dye Derived from *p*:*p*′-Diamino-ditolyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
513	New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	*o*-Toluidine *o*-Nitro-toluene	B

Diamino-dixylyl-methane

Methylene-bisxylidine (*C. A. nomen*)



$=C_{17}H_{22}N_2=254$

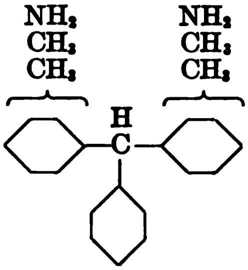
Formation.—From formaldehyde and xylidine in the presence of a condensing agent

Dye Derived from Diamino-dixylyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
299	Disazo Dye Cinnabar Scarlet BF		R Acid (2 mols)	CL

Diamino-dixylyl-phenyl-methane

Benzal-bisxylidine (*C. A. nomen.*)



$= C_{23}H_{26}N_2 = 330$

Formation.—From benzaldehyde and xylidine in the presence of a condensing agent

Literature.—Lange, Zwischenprodukte, #1434

Dye Derived from Diamino-dixylyl-phenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
300	Disazo Dye Cotton Ponceau Cinnabar Scarlet G		R Acid (2 mols)	CL

Di-*p*-amino-ethoxy-diphenyl

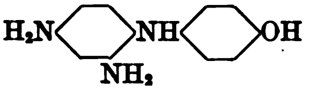
See, Ethoxy-benzidine

1:3-Diamino-2-hydroxy-benzene-5-sulfonic Acid

See, 2: 6-Diamino-1-phenol-4-sulfonic Acid

2: 4-Diamino-4′-hydroxy-diphenylamine

p-(2: 4-Diamino-anilino)-*p*henol (*C. A. nomen.*)



$=C_{12}H_{13}N_3O=215$

Formation.—Molecular proportions of 4-chloro-1: 3-dinitro-benzene and *p*-amino-phenol are heated to boiling in aqueous suspension with somewhat more than theoretical amount of limestone. The heating is done by direct steam in a vessel provided with a reflux condenser. After all the chloro-nitro-benzene has disappeared, the liquid is cooled and the crystalline 2: 4-dinitro-4′-hydroxy-diphenylamine is separated and washed. This is then reduced to the desired 2: 4-diamino-4′-hydroxy-diphenylamine

Literature.—Cain, Intermediate Products (2d Ed.), 74
Lange, Zwischenprodukte, #1670

Dye Derived from 2: 4-Diamino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
732	Sulfur Dye Autogene Black	I ’14:— 7,495	Phenol [S_2Cl_2, $S+Na_2S$]	S

α-Diamino-naphthalene

1: 5-Diamino-naphthalene (*not considered herein*)

β-Diamino-naphthalene

1: 8-Diamino-naphthalene (*not considered herein*)

4: 5-Diamino-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

See, 1: 8-Naphthylene-diamine-3: 6-disulfonic Acid

4: 8-Diamino-2: 6-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

See, 1: 5-Naphthylene-diamine-3: 7-disulfonic Acid

1: 4-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1: 4-Naphthylene-diamine-2-sulfonic Acid

2:7-Diamino-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 2:7-Naphthylene-diamine-sulfonic Acid

5:7-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

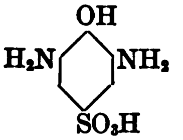
See, 1:3-Naphthylene-diamine-6-sulfonic Acid

5:8-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1:4-Naphthylene-diamine-6-sulfonic Acid

2:6-Diamino-1-*p*henol-4-sulfonic Acid (*C. A. nomen. OH=1*)

1:3-Diamino-2-hydroxy-benzene-5-sulfonic Acid



$= C_6H_8N_2O_4S = 204$

FORMATION.—Phenol is sulfonated by dissolving in hot sulfuric acid, cooled, diluted, and then dinitrated, using nitric acid and heating to boiling. The dinitro-phenol-sulfonate is then isolated, dissolved in water, and reduced with ammonium sulfide, and the diamine precipitated by acidification

LITERATURE.—Lange, Zwischenprodukte, #1137
Cain, Intermediate Products (2d Ed.), 129, 130

Dyes Derived from 2:6-Diamino-1-phenol-4-sulfonic Acid

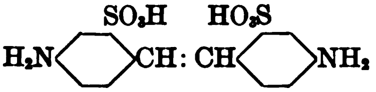
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
288	Acid Alizarin Black SE Palatine Chrome Black F	I '14:— 19,185 I '20:— 34,302	β-Naphthol (2 mols)	ACr
289	Acid Alizarin Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M 19:— ?	β-Naphthol Schaeffer's Acid	ACr

Diamino-stilbene-disulfonic Acid

p: *p*′-Diamino-diphenylethylene-*o*: *o*′-disulfonic Acid

DS (*abbreviation for above in compounds, less 2-NH_2*)

4: 4′-Diamino-2: 2′-stilbene-disulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{14}N_2O_6S_2 = 370$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—5,021 lbs.
Manufactured '20:—142,227 lbs.

FORMATION.—From sodium salt of *p*-nitro-toluene-*o*-sulfonate by dissolving in water and boiling with caustic soda until the color becomes deep red. Then reduction is effected by adding zinc dust until the liquid is decolorized

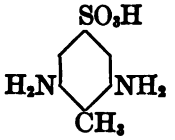
LITERATURE.—Cain, Intermediate Products (2d Ed.), 98
Lange, Zwischenprodukte, #1454

Dyes Derived from Diamino-stilbene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
301	Hessian Purple N	I '14:— 465	β-Naphthylamine (2 mols)	D
302	Brilliant Hessian Purple		Broenner's Acid (2 mols)	D
303	Brilliant Yellow Paper Yellow	I '14:—278,000 M '17:— ? M '18:— 1,664 M '19:— 48,723 I '20:— 126 M '20:— 91,218	Phenol (2 mols)	D A
304	Chrysophenine G	I '14:—157,799 M '17:— ? M '18:— 41,663 M '19:— 86,795 I '20:— 3,661 M '20:—247,202	Phenol (2 mols) [Ethylation]	D
305	Hessian Yellow		Salicylic Acid (2 mols)	D

3:5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

1-Tolylene-2:6-diamine-4-sulfonic Acid
Toluylene-diamine-sulfonic Acid
1-Methyl-2:6-diamino-benzene-4-sulfonic Acid



$= C_7H_{10}N_2O_3S = 202$

Formation.—From *o*-nitro-toluene by sulfonation, nitration and reduction

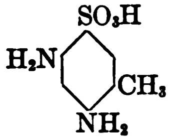
Literature.—Lange, Zwischenprodukte, #1096

Dyes Derived from 3:5-Diamino-*p*-toluene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes			
285	Toluylene Brown G		*m*-Phenylene-diamine	D
286	Toluylene Yellow	I '14:— 5,485	Nitro-*m*-phenylene-diamine (2 mols)	D
287	Toluylene Orange RR	I '14:— 500	*β*-Naphthylamine (2 mols)	D
	Tetrakisazo Dye			
488	Toluylene Brown R	I '14:— 201	Naphthionic Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

4:6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

m-Tolylene-diamine-sulfonic Acid
m-Toluylene-diamine-sulfonic Acid
1-Methyl-2:4-diamino-benzene-5-sulfonic Acid



$= C_7H_{10}N_2O_3S = 202$

STATISTICS.—Manufactured in 1918, 1919, 1920, but in undisclosed quantities

FORMATION.—By addition of *m*-tolylene-diamine sulfate to oleum, and heating the mixture for three hours on a water bath.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 87
Lange, Zwischenprodukte, #1096

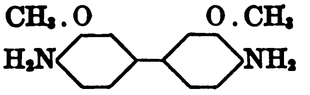
Dyes Derived from 4: 6-Diamino-*m*-toluene-sulfonic Acid ($SO_3H = 1$)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
362	Toluylene Orange R Oxydiamine Orange R	I '14:— 25,908 M '19:— ? I '20:— 1,653	Tolidine 4: 6-Diamino-*m*-toluene-sulfonic Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? M '20:— ? I '20:— 273	Tolidine *o*-Cresotic Acid	D

Dianisidine

o-Dianisidine

D (*abbreviation for Dianisidine in compounds, without the 2-NH₂ groups*)



$= C_{14}H_{16}N_2O_2 = 244$

STATISTICS.—Imported '14:—10,656 lbs.
Manufactured '17:—11,702 lbs.
Manufactured '18:— ?
Manufactured '19:—107,441 lbs.
Manufactured '20:— ?

FORMATION.—*o*-Nitro-anisole is reduced by zinc dust in presence of caustic soda and alcohol to hydrazo-anisole, which is rearranged to dianisidine by being warmed with dilute sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96
Lange, Zwischenprodukte, #1204

Dyes Derived from Dianisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
405	Benzopurpurin 10B	I '14:— 47,768 M '18:— ? M '19:— ? M '20:— 41,265 I '20:— 2,205	Naphthionic Acid (2 mols)	D
406	Diazurine B		1-Naphthylamine-6-sulfonic Acid (2 mols) β-Naphthol (2 mols)	D
407	Azo Violet		Naphthionic Acid Nevile-Winther's Acid	D
408	Dianisidine Blue		β-Naphthol (2 mols)	D
408(1)	Azophor Blue D		[Stable tetrazo-dianisole used with *p*-nitro-aniline]	MF
408(2)	Azophor Black S	I '14:— 140	[Stable tetrazo-dianisole mixed with diazo *m*-nitro-aniline, etc.]	MF
409	Trisulfon Blue B	I '14:— 813	1-Naphthol-3: 6: 8-trisulfonic Acid β-Naphthol	D
410	Benzoazurine G	I '14:— 78,699 M '18:— ? M '19:—150,589 I '20:— 287 M '20:—237,328	Nevile-Winther's Acid (2 mols)	D
411	Benzoazurine 3G	I '20:— 201	1-Naphthol-5-sulfonic (2 mols)	D
412	Congo Blue 2B		R Acid Nevile-Winther's Acid	D
413	Direct Violet BB	I '14:— 4,396	1: 7-Dihydroxy-naphthalene-4-sulfonic Acid *m*-Tolylene-diamine	D

Dyes Derived from Dianisidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
414	Indazurine B		1:7-Dihydroxy-naphthalene-4-sulfonic Acid R Acid	D
415	Dianil Blue G	M '19:— ? M '20:— ?	Chromotropic Acid (2 mols)	D
416	Brilliant Azurine 5G	I '14:— 22,324 I '20:— 1,563	1:8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
417	Chlorazol Blue 3G *or* R	I '14:— 10,151	1-Chloro-8-naphthol-5-sulfonic Acid (2 mols) *or* 1-Chloro-8-naphthol-4-sulfonic Acid (2 mols)	D
418	Diamine Brilliant Blue G	I '14:— 11,592 I '20:— 51	1-Chloro-8-naphthol-3:6-disulfonic Acid (2 mols)	D
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 351 M '20:— ?	1-Amino-8-naphthol-2:4-disulfonic Acid β-Naphthol	D
420	Azidine Wool Blue B		Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
421	Oxamine Blue B	I '14:— 35,891 I '20:— 13	1-Amino-5-naphthol-7-sulfonic Acid Nevile-Winther's Acid	D
422	Chicago Blue 4B	I '14:— 8,269	1-Amino-8-naphthol-2:4-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from Dianisidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*
	DISAZO DYES (*continued*)		
423	Chicago Blue B	M '18:— ?	1-Amino-8-naphthol-4-sulfonic Acid (2 mols)
424	Chicago Blue 6B	I '14:—118,542 M '19:— ? I '20: 7,480	1-Amino-8-naphthol-2: 4-disulfonic Acid (2 mols)

Dyes Derived from Dianisidine (*continued*)

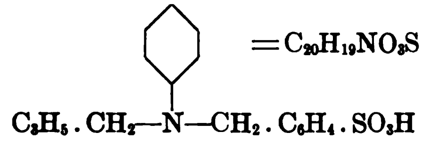
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1,821	α-Naphthylamine 1-Naphthol-3:8-disulfonic Acid	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	2 R Acid Salicylic Acid *m*-Phenylene-diamine	D

Dibenzo-pyrrole

See, Carbazole

Dibenzyl-aniline-sulfonic (disulfonic) Acid

[(*N*-Benzyl-anilino)-methyl]-*b*enzene-sulfonic Acid (*C. A. nomen.*)



$C_6H_5 . CH_2—N—CH_2 . C_6H_4 . SO_3H$

$= C_{20}H_{19}NO_3S = 353$

FORMATION.—Aniline, benzyl chloride and sodamide are mixed together and then heated up on water bath until ammonia is all off, resulting in the formation of dibenzyl-aniline. This latter is then sulfonated

LITERATURE.—Lange, Zwischenprodukte, #1561

Dye Derived from Dibenzyl-aniline-sulfonic (disulfonic) Acid

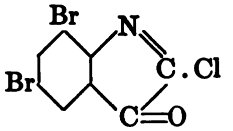
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
531	Eriocyanine A	I '14:— 25,091 I '20:— 8,223	Tetramethyl-*p*: *p'*-diamino-benzohydrol-sulfonic Acid [Oxidation]	A

5: 7-Dibromo-2-chloro-3-pseudoindolone (*C. A. nomen.*)

See, 5: 7-Dibromo-isatin Chloride

5: 7-Dibromo-isatin Chloride

5: 7-Dibromo-2-chloro-3-*p*seudoindolone (*C. A. nomen.*)



$=C_8H_2Br_2ClNO=323.5$

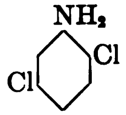
FORMATION.—Isatin is gently warmed with bromine in concentrated sulfuric acid, giving 5: 7-dibromo-isatin, which is then warmed with phosphorus pentachloride and benzene

LITERATURE.—Ullmann, Enzy. tech. Chemie, **6**, 526
Lange, Zwischenprodukte, #2122

Dyes Derived from 5: 7-Dibromo-isatin Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
893	Alizarin Indigo G	I '20:— 1,596	1-Anthrol	V
895	Alizarin Indigo 3R	I '20:— 3,514	α-Naphthol	V

2: 5-Dichloro-aniline



$=C_6H_5Cl_2N=162$

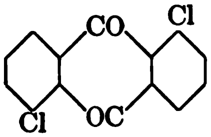
FORMATION.—From 2: 5-dichloro-nitro-benzene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 50

Dyes Derived from 2:5-Dichloro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
218	Nigrophor BASF		1-Amino-8-naphthol-5-sulfonic Acid *p*-Nitro-aniline	MF
	TRISAZO DYES			
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	Benzidine *m*-Phenylene-diamine H Acid	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine Phenol H Acid	D
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine Gamma Acid H Acid	D

1:5-Dichloro-anthraquinone



$=C_{14}H_6Cl_2O_2=277$

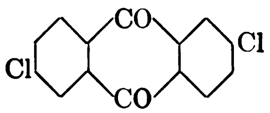
FORMATION.—Sodium 1:5-anthraquinone-disulfonate in dilute hydrochloric acid is heated to boiling and treated with a solution of sodium chlorate

LITERATURE.—Cain, Intermediate Products (2d Ed.), 250
Lange, Zwischenprodukte, #3083, 3086
Ullmann, Enzy. tech. Chemie, **1**, 472

Dye Derived from 1:5-Dichloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
832	Indanthrene Violet RN	I '14:— 11,667 I '20:— 49	Anthranilic Acid (2 mols)	V

2:6-Dichloro-anthraquinone



$= C_{14}H_6Cl_2O_2 = 277$

FORMATION.—2:6-Anthraquinone-disulfonic acid is treated with chlorine

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 472
Cf. Ber., **37**, 4706
Lange, Zwischenprodukte, #3164, 3165

Dyes Derived from 2:6-Dichloro-anthraquinone

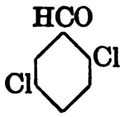
FORMATION.—From anthraquinone-2:7-disulfonic acid by treatment with hydrochloric acid and sodium chlorate; or better from 9:10-dichloro-anthracene-2:7-disulfonic acid by treatment with the same reagents

LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 472
Lange, Zwischenprodukte, #3165

Dyes Derived from 2:7-Dichloro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
827	Indanthrene Bordeaux B extra	I '14:— 28,728 I '20:— 4,056	1-Amino-6-chloro-anthraquinone (2 mols)	V
830	Indanthrene Red R	I '14:— 2,099 I '20:— 6,595	1-Amino-anthraquinone (2 mols)	V

2:5-Dichloro-benzaldehyde



$=C_7H_4Cl_2O=175$

FORMATION.—From 2-chlor-5-nitro-benzaldehyde by the substitution of the nitro group by chlorine

LITERATURE.—Lange, Zwischenprodukte, #669
Beil, III, 13

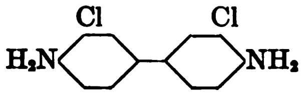
Dyes Derived from 2:5-Dichloro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
497	New Fast Green 2B Victoria Green 3B	I '14:— 44,595	Dimethyl-aniline (2 mols) [Oxidation]	B
501	Glacier Blue Brilliant Glacier Blue	I '14:— 2,495	Methyl-*o*-toluidine (2 mols) [Oxidation]	B

o: o'-Dichloro-benzidine

2: 2'-Dichloro-benzidine (*C. A. nomen.* $NH_2 = 1$)

3: 3'-Dichloro-benzidine (*Usual numbering, point of attachment = 1*)



$= C_{12}H_{10}Cl_2N_2 = 253$

FORMATION.—(1) By chlorinating of diacetyl-benzidine, and hydrolyzing product. (2) By reducing *o*-chloro-nitro-benzene in alkaline solution with zinc, and rearranging with acid the *o*: *o*'-dichloro-hydrazo-benzene formed (similar to benzidine formation from nitrobenzene)

LITERATURE.—Cain, Intermediates (2d Ed.), 94
Lange, Zwischenprodukte, #1229, 1230

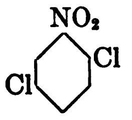
Dyes Derived from o: o' Dichloro-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
356	Dianol Red 2B	I '14:— 4,422 I '20:— 17,632	Naphthionic Acid (2 mols)	D
357	Dianol Red B		Broenner's Acid (2 mols)	D
358	Brilliant Dianol Red R extra Diphenyl Red	I '14:— 14,305 I '20:— 3,704	Amino-R Acid (2 mols)	D

2: 5-Dichloro-4-(4: 5-dihydro-5-keto-3-methyl-1-pyrazolyl)-*ben*zene-sulfonic Acid (*C. A. nomen.*)

See, 1-(2': 5'-Dichloro-4'-sulfo-phenyl)-3-methyl-5-pyrazolone

2: 5-Dichloro-nitro-benzene



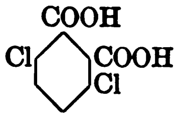
$= C_6H_3Cl_2NO_2 = 192$

FORMATION.—By nitration of *p*-dichloro-benzene with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14
Lange, Zwischenprodukte, #674

USES.—For preparing 2: 5-dichloro-aniline

3: 6-Dichloro-*p*hthalic Acid



$= C_8H_4Cl_2O_4 = 235$

STATISTICS.—Imported '14:—very small
Manufactured '18:— ?

FORMATION.—(1) From dichloro-naphthalene tetrachloride, by oxidation with nitric acid. (2) From phthalic anhydride dissolved in oleum by chlorination in presence of iodine, and by separation from the isomers formed at the same time

LITERATURE.—Lange, Zwischenprodukte, #992
Cain, Intermediate Products (2d Ed.), 165

Dyes Derived from 3: 6-Dichloro-phthalic Acid

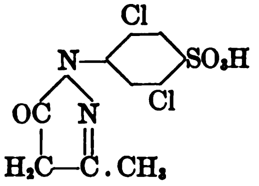
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
584	Fast Acid Blue R	I '14:— 3,022 I '20:— 130	Resorcinol (2 mols) *p*-Phenetidine (2 mols) [PCl_5; Sulfonation] *or* [Tetrachloro-fluoresceine and *p*-phenetidine; Sulfonation]	A
593	Phloxine P	I '14:— 2,244 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol (2 mols) [Bromination] *or* [Dichloro-fluoresceine brominated]	A

Dyes Derived from 3:6-Dichloro-phthalic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
594	Cyanosine, Spirit Soluble		Resorcinol (2 mols) [Bromination, methylation] *or* [Phloxine P methyl ester]	A
595	Rose Bengal	I '14:— 2,277 M '20:— ?	Resorcinol (2 mols) [Iodation] *or* [Dichloro-fluoresceine iodated]	A

1-(2:5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone

2:5-Dichloro-4-(4:5-dihydro-5-keto-3-methyl-1-pyrazolyl)-benzene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8Cl_2N_2O_4S = 323$

FORMATION.—2:5-Dichloro-aniline-4-sulfonic acid is diazotized and reduced to 2:5-dichloro-phenyl-hydrazine-4-sulfonic acid, which latter body by condensation with ethyl acetoacetate forms the above pyrazolone derivative

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170
Cf. Lange, Zwischenprodukte, #138

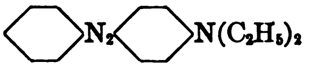
Dye Derived from 1-(2: 5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYE			
22	Xylene Yellow 3G	I '14:— 23,074 I '20:— 77,782	Sulfanilic Acid	A

p-Diethylamino-azo-benzene

Benzene-azo-diethylaniline

N: *N*-Diethyl-*p*-phenylazo-aniline (*C. A. nomen.*)



$=C_{16}H_{19}N_3=253$

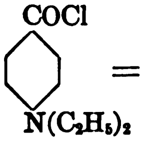
FORMATION.—By coupling diazo-benzene chloride (diazotized aniline) with diethyl-aniline

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 80

Dyes Derived from *p*-Diethylamino-azo-benzene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
641	Coreine RR Cœlestine Blue B	I '14:— 1,320 I '20:— 44	Gallamide	M
646	Coreine AR		Gallamide Aniline [Sulfonation] *or* [Coreine RR, Aniline, Sulfonation]	M

p-Diethylamino-benzoyl Chloride



$=C_{11}H_{14}ClNO=211.5$

FORMATION.—(1) *p*-Amino-benzoic acid is ethylated, and then treated with phosphorus pentachloride to form the desired acid chloride. (2) Diethyl-aniline is subjected to the action of phosgene first at ordinary temperatures until no more gas is absorbed, and then after melting the crystalline mass first obtained. The product is mixed with water and the excess of diethyl-aniline removed by acetic acid. The acid chloride is formed by treatment with phosphorus pentachloride

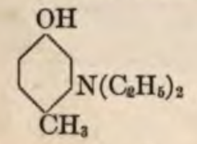
LITERATURE.—Cain, Intermediate Products (2d Ed.), 148

Dye Derived from *p*-Diethylamino-benzoyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
534	TRIPHENYL-METHANE DYE Acid Violet 7B	I '14:— 21,665 I '20:— 51	*N*-Methyl-diphenyl-amine (2 mols)	A

3-Diethylamino-*p*-cresol (*C. A. nomen. OH = 1*)

Diethyl-*m*-amino-*p*-cresol (*OH = 1*)



$= C_{11}H_{17}NO = 179$

FORMATION.—From diethyl-*o*-toluidine by sulfonation in the cold with oleum and caustic soda fusion of the sulfonic acid

LITERATURE.—Möhlau, Klimmer and Kahl, Zeit. Farb. Chem., **1902** 316

Lange, Zwischenprodukte, #815

Dye Derived from 3-Diethylamino-*p*-cresol (OH = 1)

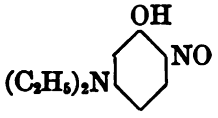
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
620	OXAZINE DYE Capri Blue GON	I' 14:— 128	Nitroso-dimethyl-aniline	B

Diethyl-*m*-amino-*p*-cresol (OH = 1)

See, 3-Diethylamino-*p*-cresol (*C. A. nomen. OH = 1*)

5-Diethylamino-2-nitroso-*p*henol (*C. A. nomen.*)

Nitroso-diethyl-*m*-amino-phenol



$= C_{10}H_{14}N_2O_2 = 194$

FORMATION.—Diethyl-*m*-amino-phenol (which can be prepared by sulfonating diethyl-aniline and then fusing the sulfonic acid to produce the diethyl-*m*-amino-phenol) is dissolved in hydrochloric acid, cooled with ice to 0° C., and sodium nitrite solution introduced

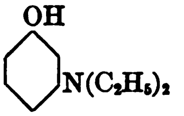
LITERATURE.—Lange, Zwischenprodukte, #906

Dyes Derived from 5-Diethylamino-2-nitroso-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
653	Nile Blue A	I '14:— 1,518 I '20:— 1,241	α-Naphthylamine	B
654	Nile Blue 2B		Benzyl-α-naphthylamine	B

***m*-Diethylamino-*p*henol** (*C. A. nomen.*)

Diethyl-*m*-amino-phenol



$= C_{10}H_{15}NO = 165$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—Diethyl-aniline is sulfonated with oleum, and the resulting diethyl-aniline-*m*-sulfonic acid fused with caustic soda

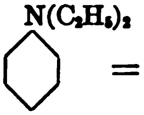
LITERATURE.—Cain, Intermediate Products (2d Ed.), 122
Lange, Zwischenprodukte, #603–606, 2263

Dyes Derived from *m*-Diethylamino-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
570	Rhodamine S	I '14:— 600 I '20:— 273	Diethyl-*m*-amino-phenol (2 mols) [Succinic Anhydride]	A
572	Rhodamine G	I '14:— 2,648 I '20:— 517	Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols) Aniline [Removes one C_2H_5 group] *or* [Rhodamine B heated with Aniline Salt]	B
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? M '20:— ? I '20:— 24,709	Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols)	B
574	Rhodamine 3B		Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols) [Ethyl esterification] *or* [Rhodamine B ethylated]	B
579	Sulfo Rhodamine B Xylene Red B	I '14:— 1,698	Benzaldehyde-di-sulfonic Acid Diethyl-*m*-amino-phenol (2 mols) [Oxidation]	A
581	Fast Acid Eosine G Fast Acid Phloxine A	I '14:— 650 I '20:— 5,234	Phthalic Anhydride Diethyl-*m*-amino-phenol (2 mols) *or* [Rhodamine B, sulfonated]	A

Diethyl-aniline

N: *N*-Diethyl-aniline (*C. A. nomen.*)



= $C_{10}H_{15}N$ = 149

STATISTICS.—Imported '14:—very small quantity
Manufactured '17:— 3,955 lbs.
Manufactured '18:—48,048 lbs.
Manufactured '19:—30,000 lbs.
Manufactured '20:—180,542 lbs.

FORMATION.—Aniline is heated in an autoclave with ethyl alcohol in the presence of a catalyst, for example, hydrochloric acid, hydrobromic acid, or iodine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 68
Lange, Zwischenprodukte, #128

Dyes Derived from Diethyl-aniline

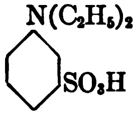
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
499	Brilliant Green	I '14:— 73,904 M '18:— ? M '19:— ? I '20:— 25 M '20:— ?	Diethyl-aniline (2 mols) Benzaldehyde [Oxidation]	B
507	Xylene Blue VS	I '14:— 2,130 I '20:— 27,254	Diethyl-aniline (2 mols) 3-Methyl-benzaldehyde-4:6-disulfonic Acid [Oxidation]	A
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Tetraethyl-diamino-benzophenone *or* Diethyl-aniline (3 mols) Phosgene *or* Tetraethyl-diamino-diphenyl-methane	B

Dyes Derived from Diethyl-aniline *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES *(continued)*			
530	Acid Violet 6B Formyl Violet Guinea Violet	I '14:—161,624 M '17:— ? M '18:— ? M '19:— ? I '20:— 3,925 M '20:—144,207	Ethyl-sulfobenzyl-aniline (2 mols) [Formaldehyde, Oxidation]	A
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) *m*-Nitro-benzaldehyde *or* *m*-Hydroxy-benzaldehyde [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) *m*-Nitro-benzaldehyde *or* *m*-Hydroxy-benzaldehyde [Sulfonation, Oxidation] *or* [Patent Blue Oxidized]	A
	AZINE DYE			
686	Amethyst Violet		Diethyl-*p*-phenylene-diamine Aniline *or* *p*-Toluidine [Oxidation]	A

Diethyl-aniline-*m*-sulfonic Acid

N: *N*-Diethyl-*m*etanilic Acid (*C. A. nomen.*)



$= C_{10}H_{15}NO_3S = 229$

FORMATION.—From diethyl-aniline by sulfonation with oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 122
Lange, Zwischenprodukte, #631

Dyes Derived from Diethyl-aniline-*m*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
59	Wool Violet S	I '14:— 308 M '18:— ? M '19:— ?	2: 4-Dinitro-aniline	A

***N*: *N*-Diethyl-metanilic Acid** (*C. A. nomen.*)

See, Diethyl-aniline-*m*-sulfonic Acid

***N*: *N*-Diethyl-*p*-nitroso-aniline** (*C. A. nomen.*)

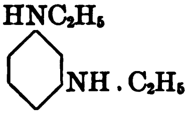
See, p-Nitroso-diethyl-aniline

***N*: *N*-Diethyl-*p*-phenylazo-aniline** (*C. A. nomen.*)

See, p-Diethylamino-azo-benzene

***N*: *N'*-Diethyl-*m*-phenylene-diamine** (*C. A. nomen.*)

s-Diethyl-*m*-phenylene-diamine



$=C_{10}H_{16}N_2=164$

FORMATION.—Probably by heating resorcinol with ethylamine in the presence of a dehydrating agent

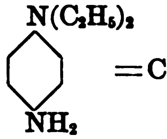
LITERATURE.—*Cf.* Green, Organic Coloring Matters (1908), 37.
Cf. Calm, Ber., **16**, 2792 (1883)

Dye Derived from *N*: *N'*-Diethyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
678	Fast Neutral Violet B	M '17:— ?	Nitroso-dimethyl-aniline	B

***N*: *N*-Diethyl-*p*-phenylene-diamine** (*C. A. nomen.*)

p-Amino-diethyl-aniline



$= C_{10}H_{16}N_2 = 164$

FORMATION.—Diethyl-aniline is converted into *p*-nitroso-diethyl-aniline by nitrous acid, which by reduction with zinc dust and hydrochloric acid yields the *p*-amino-diethyl-aniline

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #561–563

Dye Derived from *N*: *N*-Diethyl-*p*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
686	AZINE DYE Amethyst Violet		Diethyl-aniline Aniline *or* *p*-Toluidine [Oxidation]	A

***s*-Diethyl-*m*-phenylene-diamine**

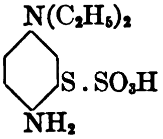
See, *N*: *N'*-Diethyl-*m*-phenylene-diamine

Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

p-Amino-diethyl-aniline-thiosulfonic Acid

4-Amino-1-diethylamino-benzene-3-thiosulfonic Acid

2-Amino-5-diethylamino-benzene-thiosulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{16}N_2O_3S_2 = 276$

FORMATION.—12 parts of the zinc chloride double salt of diethyl-*p*-phenylene-diamine are dissolved in 90 parts of water, treated with a solution of 25 parts of aluminum sulfate and 20 parts of sodium thiosulfate in 70 parts of water, and finally oxidized with 3 parts of potassium bichromate dissolved in 30 parts of water

LITERATURE.—Lange, Zwischenprodukte, #931, 932

Dye Derived from Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
666	THIAZINE DYE Indochromogen S		1:2-Naphthoquinone-4:6-disulfonic Acid	M

3:4-Dihydro-3:4-diketo-1:7-naphthalene-disulfonic Acid (*C. A. nomen.*)

See, 1:2-Naphthoquinone-4:6-disulfonic Acid

3:4-Dihydro-3:4-diketo-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1:2-Naphthoquinone-4-sulfonic Acid

***p*-(4:5-Dihydro-5-keto-3-methyl-1-pyrozolyl)-*benzene*-sulfonic Acid** (*C. A. nomen.*)

See, 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

1:2-Dihydroxy-anthraquinone

See, Alizarin

1:5-Dihydroxy-anthraquinone

See, Anthrarufin

2:4-Dihydroxy-benzoic Acid

See, β-Resorcylic Acid (*C. A. nomen.*)

3:5-Dihydroxy-benzoic Acid

See, α-Resorcylic Acid (*C. A. nomen*)

***m*-Dihydroxy-benzoic Acid**

See, α-Resorcylic Acid (*C. A. nomen.*)

1:7-Dihydroxy-2-carboxy-naphthalene-4-sulfonic Acid

See, 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

1:7-Dihydroxy-6-carboxy-naphthalene-3-sulfonic Acid

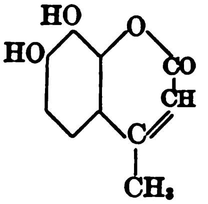
See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Dihydroxy-β-methyl-coumarin

See, 7:8-Dihydroxy-4-methyl-coumarin (*C. A. nomen.*)

7:8-Dihydroxy-4-methyl-coumarin (*C. A. nomen.*)

Dihydroxy-β-methyl-coumarin



$= C_{10}H_8O_4 = 192$

FORMATION.—From pyrogallol and acetoacetic ethyl ester

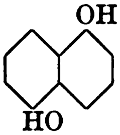
LITERATURE.—J. pr. Ch. (2) **26**, 68
Ber., **16**, 2127 (1883)

Dye Derived from 7:8-Dihydroxy-4-methyl-coumarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYE			
773	Anthracene Yellow	I '14:— 4,046	[Bromination]	M

1:5-Dihydroxy-naphthalene

1:5-Naphthalenediol (*C. A. nomen.*)



$= C_{10}H_8O_2 = 160$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

Formation.—By caustic soda fusion of sodium naphthalene-1: 5-disulfonate or of sodium 1-naphthol-5-sulfonate

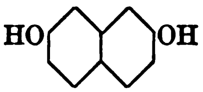
Literature.—Cain, Intermediate Products (2d Ed.), 230
Lange, Zwischenprodukte, #2392
Thorpe, Dic. Chemistry, 3, 646

Dye Derived from 1: 5-Dihydroxy-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
157	Diamond Black PV	I '14:—285,074	*o*-Amino-phenol-*p*-sulfonic Acid	M

2: 7-Dihydroxy-naphthalene

2: 7-Naphthalenediol (*C. A. nomen.*)



$=C_{10}H_8O_2=160$

Formation.—By caustic soda fusion of F acid (2-naphthol-7-sulfonic acid)

Literature.—Lange, Zwischenprodukte, #2401
Green, Organic Coloring Matters (1908), 54
Thorpe, Dic. Chemistry, 3, 647

Dyes Derived from 2: 7-Dihydroxy-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITROSO DYE			
3	Dioxine		[Nitrous Acid]	M
	OXAZINE DYE			
655	Muscarine		Nitroso-dimethyl-aniline	B

1:7-Dihydroxy-naphthalene-2-carboxylic-4-sulfonic Acid

See, 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

1:7-Dihydroxy-naphthalene-6-carboxylic-3-sulfonic Acid

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

1:8-Dihydroxy-naphthalene-3:6-disulfonic Acid

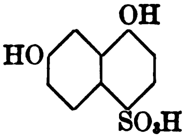
See, Chromotropic Acid

4:5-Dihydroxy-2:7-naphthalene-disulfonic Acid (*C. A. nomen.*)

See, Chromotropic Acid

1:7-Dihydroxy-naphthalene-4-sulfonic Acid

4:6-Dihydroxy-1-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8O_5S = 240$

FORMATION.—From 1 hydroxy-naphthalene-2-carboxylic-4:7-disulfonic acid by fusion with alkalis, whereby first a sulfonic group is replaced by hydroxyl and then at a higher temperature carbon dioxide is split out

LITERATURE.—Lange, Zwischenprodukte, #2617, 2618
Thorpe, Dic. Chemistry, **3**, 650

Dyes Derived from 1:7-Dihydroxy-naphthalene-4-sulfonic Acid

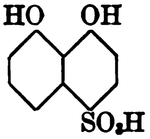
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
413	Direct Violet BB	I '14:— 4,396	Dianisidine *m*-Tolylene-diamine	D
414	Indazurine B		Dianisidine R Acid	D

1:8-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthalene-sulfonic Acid S

S Acid

4:5-Dihydroxy-1-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8O_5S = 240$

STATISTICS.—Imports '14:—2,178 lbs.

FORMATION.—(1) From 1-naphthol-4:8-disulfonic acid by fusion with caustic soda, preferably in an autoclave. (2) From 1-naphthylamine-4:8-disulfonic acid by fusion with caustic soda, in an autoclave. (3) From 1-amino-8-naphthol-4-sulfonic acid by heating with sodium sulfite

LITERATURE.—Cain, Intermediate Products (2d Ed.), 230
Lange, Zwischenprodukte, #2621, 2622

Dyes Derived from 1:8-Dihydroxy-naphthalene-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
63	Azo Acid Blue	I '14:— 45,098 I '20:— 9,222	Dimethyl-*p*-phenylene-diamine *or* *p*-Nitro-aniline [Reduction and alkylation]	A
71	Azo Fuchsine B		Toluidine	A
118	Brilliant Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	Dehydro-thio-*p*-toluidine	D
146	Azo Fuchsine G	I '14:— 17,819 I' 20:— 3,694	Sulfanilic Acid	A
147	Azo Fuchsine 6B	I '14:— 13,206 M '17:— ? M '18:— ?	Sulfanilic Acid (?)	A

Dyes Derived from 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
229	Azo Acid Violet	I '14:— 150 I '20:— 11 M '20:— ?	Amino-azo-benzene	A
242	Sulfon Black G		Aniline 1-Naphthylamine-6- *and* 7-sulfonic Acids [Cleve's Acids]	A
262	Victoria Black B	I '14:— 557	Sulfanilic Acid α-Naphthylamine	A
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,061	Amino-salicylic α-Naphthylamine	ACr
416	Brilliant Azurine 5G	I '14:— 22,324 I '20:— 1,563	Dianisidine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
	TRISAZO DYES			
452	Benzo Indigo Blue		Tolidine α-Naphthylamine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
460	Benzo Black Blue 5G	I '14:— 602	Benzidine-disulfonic-Acid α-Naphthylamine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D

4: 5-Dihydroxy-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid

4:6-Dihydroxy-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, 1: 7-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthalene-sulfonic Acid S

See, 1:8-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthoic Acid L

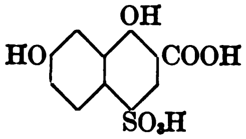
2:6-Dihydroxy-3-naphthoic Acid (*not considered herein*)

Dihydroxy-naphthoic Acid S

1:7-Dihydroxy-6-naphthoic Acid (*not considered herein*)

1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

1:7-Dihydroxy-naphthalene-2-carboxylic-4-sulfonic Acid
1:7-Dihydroxy-2-carboxy-naphthalene-4-sulfonic Acid
1:7-Dihydroxy-4-sulfo-2-*n*aphthoic Acid (*C. A. nomen.*)



$= C_{11}H_8O_7S = 284$

FORMATION.—1-Hydroxy-2-naphthoic acid is disulfonated with 4 parts of 20 per cent oleum, the product isolated and fused with caustic soda at 190–200°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 242
Lange, Zwischenprodukte, 2677

Dyes Derived from 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
396	Indazurine RM		Tolidine Nevile-Winther's Acid	D
399	Indazurine TS		Tolidine Gamma Acid	D
427	Indazurine GM		Dianisidine Nevile-Winther's Acid	D
429	Indazurine BB		Dianisidine R Acid	D
430	Indazurine 5GM		Dianisidine H Acid	D

1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

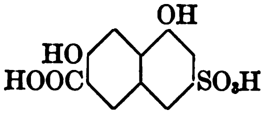
1: 7-Dihydroxy-naphthalene-6-carboxylic-3-sulfonic Acid

1: 7-Dihydroxy-6-carboxy-naphthalene-3-sulfonic Acid

Nigrotic Acid

Nigrotinic Acid

3: 5-Dihydroxy-7-sulfo-2-*n*aphthoic Acid (*C. A. nomen.*)



$=C_{11}H_8O_7S=284$

Formation.—2-Hydroxy-3-naphthoic acid is disulfonated with 4 parts of 24 per cent oleum at 125–150° for from two to three hours, the product isolated, and fused with 2 parts of caustic soda at about 210–220° and then at 230–240°

Literature.—Cain, Intermediate Products (2d Ed.), 241
Lange, Zwischenprodukte, #2678

Dyes Derived from 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes			
352	Direct Violet R	I '14:— 661 M '19:— ?	Benzidine *m*-Tolylene-diamine	D
353	Direct Indigo Blue BN	I '14:— 6,000	Benzidine H Acid	D
354	Direct Gray R	I '20:— 4,927	Benzidine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
397	Direct Blue R	M '17:— ?	Tolidine Nevile-Winther's Acid	D

Dyes Derived from 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid
(*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
398	Direct Gray B		Tolidine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	Dianisidine Nevile-Winther's Acid	D

1: 2-Dihydroxy-naphthoquinone

See, Naphthazarin

5: 6-Dihydroxy-1: 4-naphthoquinone

See, Naphthazarin

5: 6-Dihydroxy-α-naphthoquinone

See, Naphthazarin

1: 7-Dihydroxy-4-sulfo-2-*n*aphthoic Acid (*C. A. nomen.*)

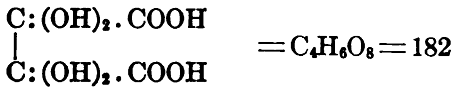
See, 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid

3: 5-Dihydroxy-7-sulfo-2-*n*aphthoic Acid (*C. A. nomen.*)

See, 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Dihydroxy-tartaric Acid

Dioxy-tartaric Acid



$$\begin{array}{l} C:(OH)_2.COOH \\ | \\ C:(OH)_2.COOH \end{array} = C_4H_6O_8 = 182$$

FORMATION.—By oxidation of tartaric acid with strong nitric acid in presence of oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 168

Dyes Derived from Dihydroxy-tartaric Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYE			
23	Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	Phenyl-hydrazine-*p*-sulfonic Acid (2 mols)	A

3:6-Dihydroxy-9-xanthene-proprionic Acid, γ-Lactone (*C. A. nomen.*)

See, Resorcinol-succinein

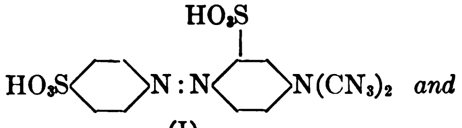
***p*-(*p*-Dimethylamino-anilino)-*p*henol** (*C. A. nomen.*)

See, 4-Dimethylamino-4′-hydroxy-diphenylamine

Dimethylamino-azo-benzene-disulfonic Acids

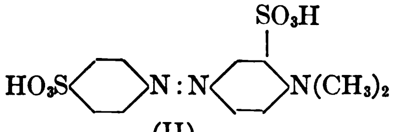
5-Dimethylamino-*o*: *p*′-azo-bis(*b*enzene-sulfonic Acid) (*C. A. nomen. for I*)

6-Dimethylamino-*m*: *p*′-azo-bis(*b*enzene-sulfonic Acid) (*C. A. nomen. for II*)



$HO_3S\langle\rangle N:N\langle\rangle N(CN_3)_2$ (with HO_3S on the second ring) *and*

(I)



$HO_3S\langle\rangle N:N\langle\rangle N(CH_3)_2$ (with SO_3H on the second ring) $=C_{14}H_{15}N_3O_6S_2=385$

(II)

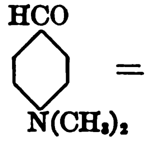
Formation.—The compound represented by "Formula I" is prepared by coupling diazotized sulfanilic acid with dimethyl-aniline-*m*-sulfonic acid (prepared by sulfonating dimethyl-aniline). The isomeric compound represented in all probability by "Formula II," is made by direct sulfonation of dimethylamino-azo-benzene by means of oleum

Literature.—Ger. Pat. 80434, Methods (b) and (a). Frdl. **4**, 490
Cf. Ullmann, Enzy. tech. Chemie, **2**, 81

Dye Derived from Dimethylamino-azo-benzene-disulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
628	Oxazine Dye Gallocyanine MS	I '20:— 22	Gallic Acid	M

p-Dimethylamino-*b*enzaldehyde



$= C_9H_{11}NO = 149$

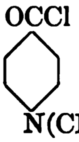
Formation.—Dimethyl-aniline is changed into dimethylamino-benzyl alcohol by treatment with hydrochloric acid and formaldehyde. This is then oxidized by adding nitroso-dimethyl-aniline directly to the crude alcohol, resulting in the formation of dimethylamino-benzylidene-amino-dimethyl-aniline, $(CH_3)_2N.C_6H_4.CH:N.C_6H_4.N(CH_3)_2$. This latter by treatment with nitrous acid or formaldehyde forms pure *p*-dimethylamino-benzaldehyde

Literature.—Ullmann, Enzy. tech. Chemie, **2**, 307
Lange, Zwischenprodukte, #333–335

Dyes Derived from *p*-Dimethylamino-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
529	Acid Violet 6B		Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Dimethyl-aniline *m*-Xylene	A

p-Dimethylamino-benzoyl Chloride


$= C_9H_{10}ClNO = 183.5$

FORMATION.—From dimethyl-aniline by action of phosgene

LITERATURE.—Beil., **2**, 1271

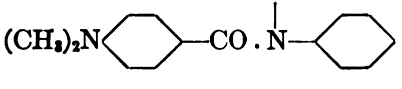
Dye Derived from *p*-Dimethylamino-benzoyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
533	Acid Violet 7BN		Methyl-diphenylamine-sulfonic Acid (2 mols)	A

Dimethylamino-benzoyl-methyl-aniline

Dimethylamino-benzo-methyl-aniline (*Schultz nomen.*)

p-Dimethylamino-*N*-methyl-*b*enzanilide (*C. A. nomen.*)


$(CH_3)_2N \cdot C_6H_4 \cdot CO \cdot N(CH_3) \cdot C_6H_5 = C_{16}H_{18}N_2O = 254$

FORMATION.—Dimethyl-aniline reacting with phosgene forms *p*-dimethylamino-benzoyl chloride, which latter unites with methyl-aniline to form the *p*-dimethylamino-benzoyl-methyl-aniline

LITERATURE.—*Cf.* Ger. Pat. 41751, 44077
Cf. Georgievics and Grandmougin, Dye Chemistry, 174

Dye Derived from Dimethylamino-benzoyl-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-METHANE DYE			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 M '20:— ? I '20:— 74,414	Dimethyl-aniline	B

6-(*p*-Dimethylamino-benzyl)-*N*: *N*-dimethyl-*metanilic* Acid (*C. A. nomen.*)

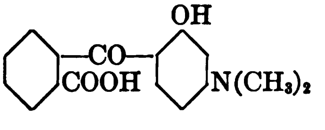
See, p: *p'*-Tetramethyl-diamino-diphenylmethane-sulfonic Acid

5-Dimethylamino-*α*-(*p*-dimethylamino-phenyl)-*α*-hydroxy-*o*-toluene-sulfonic Acid (*C. A. nomen.*)

See, p: *p'*-Tetramethyl-diamino-benzohydrol-sulfonic Acid

(Dimethylamino-hydroxy-benzoyl)-benzoic Acid

o-(4-Dimethylamino-2-hydroxy-benzoyl)-*benzoic* Acid (*C. A. nomen.*)



$= C_{16}H_{15}NO_4 = 285$

FORMATION.—By condensing phthalic anhydride and *m*-dimethylamino-phenol

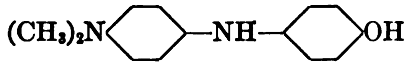
LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 232
Lange, Zwischenprodukte, #1394, 1395 (*Note Lange's formula is at variance with structure given above, which, however, corresponds to the generally accepted formula*)

Dyes Derived from (Dimethylamino-hydroxy-benzoyl)benzoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
575	Rhodine 12GM		Resorcinol Methyl Ether [Ethyl esterification]	B
576	Rhodamine 3G	I '14:— 19,568 I '20:— 855	3-Amino-*p*-cresol [Ethyl esterification]	B
577	Rhodine 2G		Ethyl-*m*-amino-phenol [Ethyl esterification]	B
578	Rhodamine 12GF		Resorcinol [Formaldehyde; esterification]	B

4-Dimethylamino-4′-hydroxy-diphenylamine

p-(*p*-Dimethylamino-anilino)-*phenol* (*C. A. nomen.*)



$= C_{14}H_{16}N_2O = 228$

FORMATION.—(1) Dimethyl-*p*-phenylene-diamine is heated with the hydrochloride of *p*-amino-phenol. (2) Dimethyl-*p*-phenylene-diamine and phenol are simultaneously oxidized and the product carefully reduced

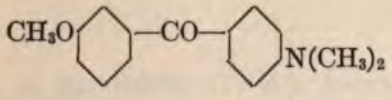
LITERATURE.—Lange, Zwischenprodukte, #1644
Lange, Swefelfarbstoffe, 145, 157

Dye Derived from 4-Dimethylamino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
728	SULFUR DYE Immedial Sky Blue	M '17:— ?	[S+Na_2S]	S

4-Dimethylamino-3′-methoxy-benzophenone (*C. A. nomen.*)

Methoxy-dimethylamino-benzophenone



$=C_{16}H_{17}NO_2=255$

FORMATION.—10 parts of *m*-methoxy-benzanilide, 14 parts of dimethyl-aniline and 7 parts of phosphorus oxychloride are heated together carefully on the water bath at 90°. The melt is treated with 50 parts of water and 5 parts of hydrochloric acid, and the yellow brown solution warmed to 70–80° until the color has disappeared, which indicates the completion of the splitting off of the aniline. More water is now added, the precipitate filtered, washed, dried, and crystallized from two parts of alcohol. From the filtrate aniline and dimethyl-aniline can be recovered

LITERATURE.—Lange, Zwischenprodukte, #1383

Dye Derived from 4-Dimethylamino-3′-methoxy-benzophenone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
547	TRIPHENYL-METHANE DYE Ketone Blue 4BN		Methyl-diphenylamine [Sulfonation]	A

***p*-Dimethylamino-*N*-methyl-*benz*anilide** (*C. A. nomen.*)

See, Dimethylamino-benzoyl-methyl-aniline

2-Dimethylamino-8-naphthol-6-sulfonic Acid

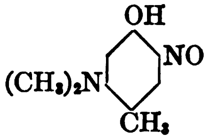
See, Dimethyl-gamma Acid

7-Dimethylamino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)

See, Dimethyl-gamma Acid

5-Dimethylamino-2-nitroso-*p*-cresol (*OH = 1*, *C. A. nomen.*)

Nitroso-dimethyl-*m*-amino-*p*-cresol (*OH = 1*)



$= C_9H_{12}N_2O_2 = 180$

FORMATION.—3-Dimethylamino-*p*-cresol (*OH = 1*) [which can be obtained by decomposing diazo-dimethyl-*o*-toluidine in an acid solution] is dissolved in hydrochloric acid, cooled to 0° C., and nitrosified with aqueous solution of sodium nitrite

LITERATURE.—Lange, Zwischenprodukte, #1089

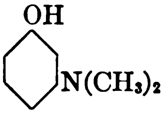
Dye Derived from 5-Dimethylamino-2-nitroso-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Uesd and Notes*	*Dye Application Class*
	OXAZINE DYE			
621	Cresyl Blue 2BS		*p*-Phenylene-diamine	B

***m*-Dimethylamino-*p*henol** (*C. A. nomen.*)

m-Hydroxy-dimethyl-aniline

Dimethyl-*m*-amino-phenol



$= C_8H_{11}NO = 137$

FORMATION.—By caustic soda fusion of dimethyl-aniline-*m*-sulfonic acid, prepared by sulfonating dimethyl-aniline with oleum

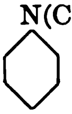
LITERATURE.—Lange, Zwischenprodukte, #603–606, 2263

Dyes Derived from *m*-Dimethylamino-phenol

Schult Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
568	Pyronine G		*m*-Dimethylamino-phenol (2 mols) [Oxidation]	B
569	Acridine Red B		*m*-Dimethylamino-phenol (2 mols) [Oxidation] *or* [Oxidation of Pyronine G with $KMnO_4$]	B
570	Rhodamine S	I '14:— 600 I '20:— 273	*m*-Dimethylamino-phenol (2 mols) [Succinic Anhydride]	A

Dimethyl-aniline

N: *N*-Dimethyl-*a*niline (*C. A. nomen.*)



$= C_8H_{11}N = 121$

STATISTICS.—Imported '14:— 48,642 lbs.
Manufactured '17:—2,847,093 lbs.
Manufactured '18:—4,263,458 lbs.
Manufactured '19:—3,559,654 lbs.
Manufactured '20:—5,447,107 lbs.

FORMATION.—By heating aniline and methanol (methyl alcohol) in an autoclave in the presence of sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 62
Lange, Zwischenprodukte, #129

Dyes Derived from Dimethyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
32	Butter Yellow Oil Yellow	I '14:— 4,062 M '17:— 33,180 M '18:— 27,669 M '19:— 31,156 M '20:— 74,182	Aniline	SS
124	Diazine Green S	I '14:— 1,340	*p*-Tolylene-diamine *o*-Toluidine Aniline *or* *o*-Toluidine *or* Safranine	B
138	Helianthine Methyl Orange	I '14:— 500 M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid	A
	AURAMINES			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	Dimethylamino-benzo-methylaniline	B
	TRIPHENYL-METHANE DYES			
495	Malachite Green	I '14:—183,852 M '17:—130,229 M '18:—290,416 M '19:—560,301 I '20:— 100 M '20:—654,237	Dimethyl-aniline (2 mols) Benzaldehyde [Oxidation]	B
496	Setoglaucine O	I '20:— 1,102	Dimethyl-aniline (2 mols) *o*-Chloro-benzaldehyde [Oxidation]	B
497	New Fast Green 2B Victoria Green 3B	I '14:— 44,595	Dimethyl-aniline (2 mols) 2: 5-Dichloro-benzaldehyde [Oxidation]	B

Dyes Derived from Dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
510	Azo Green		Dimethyl-aniline (2 mols) *m*-Nitro-benzaldehyde Salicylic Acid [Oxidation]	M
515	Methyl Violet	I '14:—255,063 M '17:—375,107 M '18:—632,196 M '19:—574,436 I '20:— 3,312 M '20:—600,873	Dimethyl-aniline (3 mols) [Phenol] [Oxidation]	B
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Ketone *or* Dimethyl-aniline (3 mols) Phosgene *or* Hydrol [Oxidation]	B
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 I '20:— 3,313 M '17:— ?	[Benzylation of Methyl Violet] *or* Benzyl-chloride Dimethyl-aniline (3 mols) [Phenol]	B
519	Methyl Green		[Methyl Chloride of Methyl Violet] *or* Dimethyl-aniline (3 mols) [Phenol and Methyl Chloride]	B

Dyes Derived from Dimethyl-aniline (*continued*)

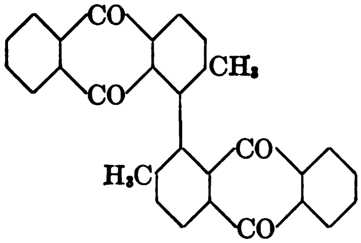
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
523	Fast Green	I '14:— 14,347 I '20:— 10,461	*m*-Nitro-benzaldehyde Dimethyl-aniline (2 mols) Benzyl-chloride (2 mols) [Sulfonation, Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	*p*-Dimethylamino-benzaldehyde *m*-Xylene	A
	THIAZINE DYES			
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline (2 mols) [$Na_2S_2O_3$, etc.] *or* Nitroso-dimethyl-aniline [$Na_2S_2O_3$, etc.] *or* Dimethyl-*p*-phenylene diamine [$Na_2S_2O_3$, etc.]	B
660	Methylene Green O	I' 14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,049	Dimethyl-aniline (2 mols) [$Na_2S_2O_3$, Nitration] *or* Nitroso-dimethyl-aniline [$Na_2S_2O_3$, etc.; Nitration] *or* Dimethyl-*p*-phenylene-diamine [$Na_2S_2O_3$, etc.; Nitration] *or* [Methylene Blue nitrated]	B
661	Thionine Blue G O	I '14:— 18,618 I '20:— 330	Ethyl-methyl-aniline [$Na_2S_2O_3$, etc.]	B

***N*: *N*-Dimethyl-*p*: *p*′-azo-bisaniline** (*C. A. nomen.*)

See, Dimethyl-*p*: *p*′-diamino-azo-benzene

2: 2′-Dimethyl-1: 1′-*bi*anthraquinone (*C. A. nomen.*)

2: 2′-Dimethyl-1: 1′-dianthraquinonyl



$=C_{30}H_{18}O_4=442$

FORMATION.—1-Amino-2-methyl-anthraquinone is dissolved in sulfuric acid and sodium nitrite added. The isolated and dried diazonium sulfate is stirred into acetic anhydride, and copper powder added. Nitrogen is evolved and the combination takes place, forming the bianthraquinone derivative

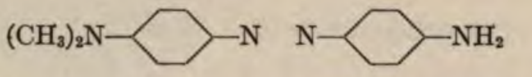
LITERATURE.—Lange, Zwischenprodukte, #3491–3493
Cain, Intermediate Products (2d Ed.), 261

Dyes Derived from 2: 2′-Dimethyl-1: 1′-bianthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
760	Indanthrene Gold Orange G Pyranthrone	I ’14:— 20,092 I ’20:— 7,617	[2 mols H_2O removed]	V
761	Indanthrene Gold Orange R	I ’14:— 50,496 I ’20:— 35,338	[2 mols H_2O removed, Chlorination] [*or* Pyranthrone 760, chlorinated]	V
762	Indanthrene Scarlet G	I ’14:— 99 I ’20:— 399	[2 mols H_2O removed, Bromination] [*or* Pyranthrone 760, brominated]	V

Dimethyl-*p*:*p*′-diamino-azo-benzene

N:*N*-Dimethyl-*p*:*p*′-azo-bisaniline (*C. A. nomen.*)



$=C_{14}H_{16}N_4=240$

FORMATION.—(1) By coupling of diazotized *p*-nitro-aniline with dimethyl-aniline and subsequent reduction with sodium sulfide. (2) By coupling of diazotized *p*-amino-acetanilide with dimethyl-aniline and splitting off of acetyl group

LITERATURE.—Heumann, Anilinfarben, **3**, 1467; **4**, 1026
Cf. Lange, Zwischenprodukte, #1760

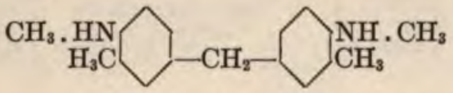
Dye Derived from Dimethyl-*p*:*p*′-diamino-azo-benzene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
239	Azotol C		*β*-Naphthol	MF

4:4′-Dimethyl-diamino-3:3′-ditolyl-methane

Dimethyl-diamino-di-*o*-tolyl-methane

4:4′-Methylene-bis(*N*-methyl-*o*-toluidine) (*C. A. nomen.*)



$=C_{17}H_{22}N_2=254$

FORMATION.—By condensing formaldehyde and two molecules of methyl-*o*-toluidine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 104
Lange, Zwischenprodukte, #1318

Dye Derived from 4:4′-Dimethyl-diamino-3:3′-ditolyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINES			
494	Auramine G	I '14:— 1,902	[Sulfur, Ammonium chloride, etc.]	B

Dimethyl-diamino-di-*o*-tolyl-methane

See, 4: 4′-Dimethyl-diamino-3: 3′-ditolyl-methane

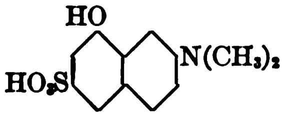
2: 2-Dimethyl-1: 1′-dianthraquinonyl

See, 2: 2′-Dimethyl-1: 1′-*b*ianthraquinone (*C. A. nomen.*)

Dimethyl-gamma Acid

2-Dimethylamino-8-naphthol-6-sulfonic Acid

7-Dimethylamino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{13}NO_4S = 267$

FORMATION.—G acid is heated with dimethylamine in an autoclave around 200°, the dimethylamino-G acid thus obtained is fused with caustic soda at 210–220°, and the dimethyl-gamma acid isolated

LITERATURE.—Lange, Zwischenprodukte, #2550

Dyes Derived from Dimethyl-gamma Acid

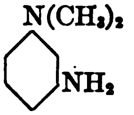
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
206	Diphenyl Catechine G	I '14:— 8,642	*p*-Nitro-toluene-*o*-sulfonic Acid *p*-Phenylene-diamine [Diphenyl Orange RR]	D
	DISAZO DYES			
348	Diphenyl Brown BN	I '14:— 13,471	Salicylic Acid Benzidine	D
393	Diphenyl Brown 3GN	M '20:— ?	Salicylic Acid Tolidine	D

N: **N-Dimethyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, *p*-Nitroso-dimethyl-aniline

N: *N*-Dimethyl-*m*-*p*henylene-diamine (*C. A. nomen.*)

m-Amino-dimethyl-aniline



$= C_8H_{12}N_2 = 136$

FORMATION.—Dimethyl-aniline is nitrated with mixed acid, and the *m*-nitro-dimethyl-aniline separated from the para isomer. The *m*-derivative is now reduced to dimethyl-*m*-phenylene-diamine

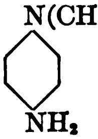
LITERATURE.—Green, Organic Coloring Matter (1908), 32

Dyes Derived from *N*: *N*-Dimethyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ACRIDINE DYES			
603	Acridine Orange NO	I '14:— 2,336 I '20:— 1,925	Dimethyl-*m*-phenylene-diamine (2 mols) [Formaldehyde, Oxidation, etc.]	B
604	Acridine Orange R		Dimethyl-*m*-phenylene-diamine (2 mols) Benzaldehyde [Ammonia removal; Oxidation]	B

N: *N*-Dimethyl-*p*-*p*henylene-diamine (*C. A. nomen.*)

p-Amino-dimethyl-aniline



$= C_8H_{12}N_2 = 136$

STATISTICS.—Imported '14:—very small
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '20:—314,931

FORMATION.—Dimethyl-aniline by action of nitrous acid forms nitroso-dimethyl-aniline, which by reduction with zinc dust and hydrochloric acid furnishes dimethyl-*p*-phenylene-diamine

LITERATURE.—Lange, Zwischenprodukte, #561–563

Dyes Derived from *N*: *N*-Dimethyl-*p*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Calss of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
62	Azogalleine		Pyrogallol	M
63	Azo Acid Blue	I '14:— 45,098 I '20:— 4,485	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	M
	INDOPHENOL			
619	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	α-Naphthol [Oxidation]	V
	OXAZINE AND THIAZINE DYES			
627	Modern Cyanine		Nitroso-dimethyl-aniline Gallamide	M
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline [$Na_2S_2O_3$, etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,047	Dimethyl-aniline [$Na_2S_2O_3$, etc.] [Nitration] *or* [Methylene Blue nitrated]	B
661	Thionine Blue G O	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline [$Na_2S_2O_3$, etc.]	B

Dyes Derived from *N*:*N*-Dimethyl-*p*-phenylene-diamine (*continued*)

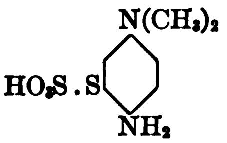
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
669	Neutral Violet		Dimethyl-*p*-phenylene-diamine (2 mols) *m*-Phenylene-diamine	B
670	Neutral Red	M '18:— ?	*m*-Tolylene-diamine	B
680	Methylene Violet BN	I '14:— 1,521 M '17:— ? I '20:— 33	Aniline (2 mols) [Oxidation]	B
681	Methylene Gray O New Fast Gray	I '14:— 29,507 M '17:— ? M '18:— 16,746 M '19:— 28,458 I '20:— 509 M '20:— 31,620	Dimethyl-*p*-phenylene-diamine (2+mols) [Oxidation]	B
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Aniline *o*- *or* *p*-Toluidine [Oxidation]	B
690	Diphene Blue R Metaphenylene Blue R	I '20:— 3,124	*sym*-Di-*p*-tolyl-*m*-phenylene-diamine [Oxidation]	B
	SULFUR DYES			
729	Kryogene Pure Blue R		Aniline (2 mols) [S+Na_2S] *or* [Methylene Violet; S+Na_2S]	S
731	Thiophor Indigo CJ		α-Naphthol [S+Na_2S]	S

_N_:_N_-Dimethyl-_p_-phenylene-diamine-thiosulfonic Acid

p-Amino-dimethyl-aniline-thiosulfonic Acid

1-Amino-4-dimethylamino-benzene-2-thiosulfonic Acid

2-Amino-5-dimethylamino-benzene-thiosulfonic Acid (*C. A. nomen.*)



$= C_8H_{12}N_2O_3S_2 = 248$

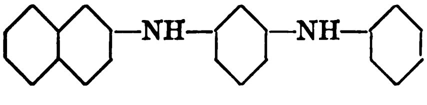
FORMATION.—10 parts of dimethyl-*p*-phenylene-diamine sulfate are dissolved in 100 parts of water and cooled to 0°, and a cold solution of 5.5 parts of potassium bichromate in 60 parts of water and 18 parts by volume of 50 per cent acetic acid, is introduced quickly during agitation. To the crystal mass is now added at once a solution of 22 parts of sodium thiosulfate and 27 parts of aluminum sulfate in 70 parts of water, and the mixture agitated at 10–20°. Upon cooling to 0° the desired product separates out

LITERATURE.—Lange, Zwischenprodukte, #931

Dyes Derived from *N*: *N*-Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYES			
661	Thionine Blue G O	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline	B
664	Lenco-gallo Thionine DH		Gallic Acid	M
665	Urania Blue	I '14:— 132	*N*: *N'*-Di-2-naphthyl-*m*-phenylene-diamine	A
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	1: 2-Naphthoquinone-4: 6-disulfonic Acid	M

N: *N'*-Di-2-naphthyl-*m*-phenylene-diamine



$= C_{26}H_{20}N_2 = 360$

FORMATION.—108 parts of *m*-phenylene-diamine, 432 parts of β-naphthol and 2–3 parts of iodine are heated together at 200° and finally at 260°. The melt is powdered, and washed successively with dilute caustic soda, hydrochloric acid, water, alcohol, and ether. The residue is crystallized from aniline. Yield good

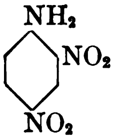
LITERATURE.—Lange, Zwischenprodukte, #2875, 2876

Dyes Derived from *N*:*N'*-Di-2-naphthyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
	THIAZINE DYE			
665	Urania Blue	I '14:— 132	Dimethyl-*p*-phenylene-diamine- thiosulfonic Acid	A
	AZINE DYE			
692	Naphthazine Blue	I '14:— 6,261 I '20:— 2,249	Nitroso-dimethyl-aniline	A

2:4-Dinitro-aniline (*C. A. nomen.*)

m-Dinitro-aniline



$=C_6H_5N_3O_4=183$

FORMATION.—Aniline is condensed with phthalic acid, and the phthalanil dinitrated. Upon heating the latter product with aniline under pressure the 2:4-dinitro-aniline is split off

LITERATURE.—Lange, Zwischenprodukte, #539

Dyes Derived from 2:4-Dinitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
59	Wool Violet S	I '14:— 308 M '18:— ? M '19:— ?	Diethyl-aniline-*m*-sulfonic Acid	A

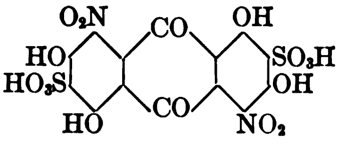
m-Dinitro-aniline

See, 2: 4-Dinitro-aniline (*C. A. nomen.*)

p-(2: 4-Dinitro-anilino)-phenol (*C. A. nomen.*)

See, 2: 4-Dinitro-4′-hydroxy-diphenylamine

4: 8-Dinitro-anthrachrysone-2: 6-disulfonic Acid



$= C_{14}H_6N_2O_{16}S_2 = 522$

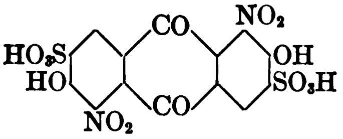
Formation.—Anthrachrysone is sulfonated and nitrated

Literature.—Green, Organic Coloring Matters (1908), #554 and #557

Dye Derived from 4: 8-Dinitro-anthrachrysone-2: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dye			
796	Acid Alizarin Green G	I '20:— 1,334	[Sodium sulfide reduction]	ACr

1: 5-Dinitro-anthraflavic-3: 7-disulfonic Acid



$= C_{14}H_6N_2O_{14}S_2 = 490$

Formation.—By the sulfonation and nitration of anthraflavic acid (which is prepared by heating *m*-hydroxy-benzoic acid with sulfuric acid at 190° C.)

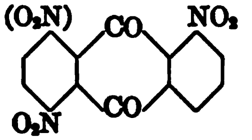
Literature.—Thorpe, Dic. Chemistry, **1**, 84
Cf. Bucherer, Lehrbuch des Farbenchemie, 339 (1914)

Dye Derived from 1:5-Dinitro-anthraflavic-3:7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
857	Erweco Alizarin Acid Blue R		Aniline (2 mols) [Sulfonation]	ACr

Dinitro-anthraquinone

(1:5-*and* 1:8-Dinitro-anthraquinones)



$=C_{14}H_6N_2O_6=238$

STATISTICS.—Manufactured '19:— ?

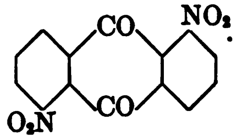
FORMATION.—The mixed compounds are obtained from anthraquinone, by nitration in sulfuric acid solution, and by pouring the nitration product into water

LITERATURE.—Cain, Intermediate Products (2d Ed.), 253

Dyes Derived from Dinitro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
749	Anthraquinone Black		[S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
790	Anthracene Blue	I '14:— 26,642 I '20:— 3,539	[Sulfonation, Oxidation]	ACr
801	Anthracene Blue WGG	I '20:— 1,500	[Oxidation]	M
802	Anthracene Blue WG new		[Oxidation]	M

1: 5-Dinitro-anthraquinone



$=C_{14}H_6N_2O_6=238$

STATISTICS.—Manufactured '20:— ?

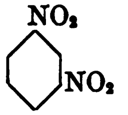
FORMATION.—From anthraquinone in sulfuric acid solution by nitration with HNO_3 or $NaNO_3$. The mixed 1: 5 and 1: 8 dinitro-anthraquinones are recovered by pouring the nitration mixture into water. By extraction of the mixed dinitro-compounds with acetone or alcohol, the 1: 5-dinitro-anthraquinone is left behind

LITERATURE.—Cain, Intermediate Products (2d Ed.), 253
Lange, Zwischenprodukte, #3218

Dyes Derived from 1: 5-Dinitro-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
749	Anthraquinone Black		[S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
800	Anthracene Blue WG	I '14:— 54,812 I '20:— 2,049	[Oxidation]	M
853	Anthraquinone Violet	I '14:— 1,202 I '20:— 1,649	*p*-Toluidine (2 mols) [Sulfonation]	ACr

m-Dinitro-*benzene*



$=C_6H_4N_2O_4=168$

STATISTICS.—Imported	'14:—	164,650 lbs.
Manufactured	'17:—	2,333,192 lbs.
Manufactured	'18:—	4,115,269 lbs.
Manufactured	'19:—	2,280,282 lbs.
Manufactured	'20:—	3,380,112 lbs.

FORMATION.—By nitration of nitro-benzene or of benzene, using mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 32
Cf. Lange, Zwischenprodukte, #543

USES.—For the manufacture of *m*-nitro-aniline and *m*-phenylene-diamine

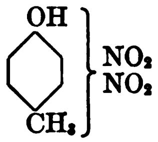
2: 2′-Dinitro-*p*: *p*′-biacetanilide

See, Diacetyl-*o*: *o*′-dinitro-benzidine

2: 4-Dinitro-chloro-benzene

See, 1-Chloro-2: 4-dinitro-benzene (*C. A. nomen.*)

Dinitro-*p*-cresol



$=C_7H_6N_2O_5=198$

FORMATION.—Probably by the dinitration of *p*-cresol

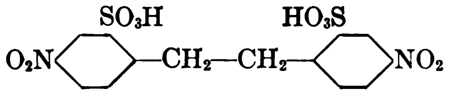
LITERATURE.—*Cf.* Thorpe, 2, 165
Cf. Lange, Schwefelfarbstoffe, 132, 381

Dye Derived from Dinitro-*p*-cresol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
725	SULFUR DYE Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	[S+Na_2S]	S

Dinitro-dibenzyl-disulfonic Acid

2: 2′-Ethylene-bis(5-nitro-*b*enzene-sulfonic Acid) (*C. A. nomen.*)



$=C_{14}H_{12}N_2O_{10}S_2=432$

FORMATION.—12 parts of sodium *p*-nitro-toluene-sulfonate are dissolved in 50 parts of hot water, and treated with 100 parts of sodium hypochlorite solution (2 per cent HOCl) and 50 parts of caustic soda solution (40°) at 70°. At end of reaction, cooled with ice to 40° and after crystallizing several hours, the product is filtered off.

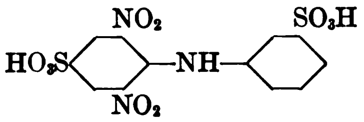
LITERATURE.—Lange, Zwischenprodukte, #1460

Dyes Derived from Dinitro-dibenzyl-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M '20:— ?	Dinitro-dibenzyl-disulfonic Acid (2 mols)	D
12	Diphenyl Citronine G		Aniline	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydrothio-toluidine-sulfonic Acid (2 mols) *or* Primuline-sulfonic Acid (2 mols)	D

2: 5-Dinitro-diphenylamine-3′: 4-disulfonic Acid

3: 5-Dinitro-3′: 4-imino-bis(*b*enzene-sulfonic Acid) (*C. A. nomen.*)



$$= C_{12}H_9N_3O_{10}S_2 = 419$$

FORMATION.—By reaction of 1-chloro-2: 6-dinitro-benzene-4-sulfonic acid and metanilic acid in presence of sodium acetate

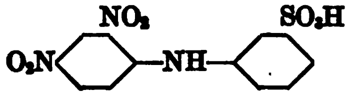
LITERATURE.—Lange, Zwischenprodukte, #1712
Cf. Schultz, Farbstofftabellen, #542

Dye Derived from 2:5-Dinitro-diphenylamine-3':4-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
542	Agalma Green B	I '14:— 2,294	Hydrol	A

2:4-Dinitro-diphenylamine-3'-sulfonic Acid

N-(2:4-Dinitro-phenyl)-*m*etanilic Acid (*C. A. nomen.*)



$= C_{12}H_9N_3O_7S = 339$

FORMATION.—From chloro-dinitro-benzene and metanilic acid

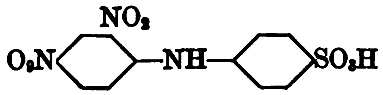
LITERATURE.—Lange, Zwischenprodukte, #1673
Cf. Schultz, Farbstofftabellen (1914), #738

Dye Derived from 2:4-Dinitro-diphenylamine-3'-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
738	Cotton Black		[S+Na₂S]	S

2:4-Dinitro-diphenylamine-4'-sulfonic Acid

N-(2:4-Dinitro-phenyl)-sulfanilic Acid (*C. A. nomen.*)



$= C_{12}H_9N_3O_7S = 339$

FORMATION.—From chloro-dinitro-benzene and sulfanilic Acid

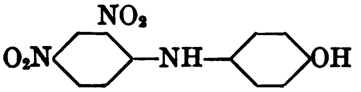
LITERATURE.—Lange, Zwischenprodukte, #1673
Cf. Schultz, Farbstofftabellen, #738

Dye Derived from 2: 4-Dinitro-diphenylamine-4′-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
738	Cotton Black		[S+Na_2S]	S

2: 4-Dinitro-4′-hydroxy-diphenylamine

p-(2: 4-Dinitro-anilino)-*p*henol (*C. A. nomen.*)



$=C_{12}H_9N_3O_5=275$

STATISTICS.—Manufactured 1919 but amount not disclosed

FORMATION.—From chloro-dinitro-benzene and *p*-amino-phenol by boiling molecular proportions in an aqueous suspension with slightly more than the theoretical amount of limestone

LITERATURE.—Cain, Intermediate Products (2d Ed.), 73
Lange, Zwischenprodukte, #1670

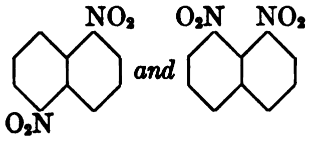
Dyes Derived from 2: 4-Dinitro-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
724	Immedial Black	I ’14:— 54,696 M ’18:— ?	[S+Na_2S]	S
725	Immedial Dark Brown A Immedial Brown B	I ’14:— 23,887 M’18:— ?	[NaOH; S+Na_2S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I ’14:— 10,934 I ’20:— 2,498	[Alcohol; S+Na_2S]	S

3: 5-Dinitro-3′: 4-imino-bis(*benzene*-sulfonic Acid) (*C. A. nomen.*)

See, 2: 5-Dinitro-diphenylamine-3′: 4-disulfonic Acid

1: 5-*and* 1: 8-Dinitro-*n*aphthalenes



$= C_{10}H_6N_2O_4 = 218$

STATISTICS.—Imported '14:—very small amount
Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—From α-nitro-naphthalene by nitration

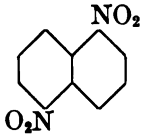
LITERATURE.—Cain, Intermediate Products (2d Ed.), 170

Dyes Derived from 1: 5- *and* 1: 8-Dinitro-naphthalenes

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
774	Alizarin Black	I '14:—205,439 I '20:— 17,421	[Oxidation]	M
775	Alizarin Dark Green W		Phenol [Oxidation]	M
776	Printing Black for Wool		[Reduction]	A

1: 5-Dinitro-*n*aphthalene

α-Dinitro-naphthalene



$= C_{10}H_6N_2O_4 = 218$

FORMATION.—α-Nitro-naphthalene is nitrated, resulting in formation of 1: 5 and 1: 8-dinitro-naphthalenes in the proportion of about

1:2. This crude product is washed with water and dried, and then extracted first with carbon disulfide to remove nitro-naphthalene, and second with acetone to remove the 1:8 isomer,—leaving behind the 1:5 isomer. (See 1:8-dinitro-naphthalene)

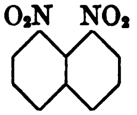
LITERATURE.—Cain, Intermediate Products (2d Ed.), 170
Lange, Zwischenprodukte, #2315

Dyes Derived from 1:5-Dinitro-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
745	Melanogene Blue		[S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
789	Anthracene Blue WR	I '14:—107,778 I '20:—103,913 M '20:— ?	[Oxidation]	M

1:8-Dinitro-*n*aphthalene

β-Dinitro-naphthalene



$=C_{10}H_6N_2O_4=218$

FORMATION.—α-Nitro-naphthalene is nitrated, resulting in the formation 1:5 and 1:8-dinitro-naphthalenes in the proportion of about 1:2. The nitration mass upon cooling deposits most of the 1:5-isomer, and upon pouring this filtrate into water the 1:8-isomer is precipitated, which can be purified by crystallization from benzene. (See 1:5-dinitro-benzene)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170
Lange, Zwischenprodukte, #2315

Dyes Derived from 1:8-Dinitro-naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
740	Fast Black B		[Na_2S]	S
741	Fast Black BS		[Na_2S; Alkalies] *or* [Fast Black B; Alkalies]	S
742	Printing Blue for Wool		[Na_2S, $NaHSO_3$, $NaOH$]	S
743	Kryogene Brown A		[Na_2S, $NaHSO_3$, $NaOH$; $S+Na_2S$]	S
750	Kryogene Brown A, G	I '14:— 10,313	[$NaHSO_3$; $S+Na_2S$]	S

α-Dinitro-naphthalene

See, 1:5-Dinitro-naphthalene

β-Dinitro-naphthalene

See, 1:8-Dinitro-naphthalene

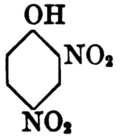
γ-Dinitro-naphthalene

1:3-Dinitro-naphthalene (*not considered herein*)

δ-Dinitro-naphthalene

1:6-Dinitro-naphthalene (*not considered herein*)

2:4-Dinitro-phenol



$=C_6H_4N_2O_5=184$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From chloro-dinitro-benzene by boiling with sodium carbonate solution

LITERATURE.—Cain, Intermediate Products (2d Ed.), 113
Lange, Zwischenprodukte, #577, 1121

Dyes Derived from 2: 4-Dinitro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
720	Sulfur Black	I '14:— 4,923,981(?) M '17:— 9,298,631 M '18:— 12,385,130 M '19:— 14,504,770 I '20:— 662 M '20:— 16,305,037	[$S+Na_2S$]	S
721	Sulfur Black Thio Cotton Black		[*p*-Amino-phenol-sulfonic Acid] [$S+Na_2S$]	S
722	Auronal Black	I '14:— 50,879	[$S+Na_2S$]	S
723	Autogene Black EEB		[$S+Na_2S$]	S

***N*-(2: 4-Dinitro-phenyl)-*metanilic* Acid** (*C. A. nomen.*)

See, 2: 4-Dinitro-diphenylamine-3′-sulfonic Acid

***N*-(2: 4-Dinitro-phenyl)-*p*-*phenylene*-diamine** (*C. A. nomen.*)

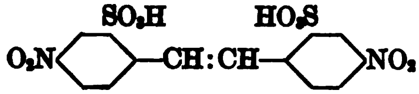
See 4′-Amino-2: 4-dinitro-diphenylamine

***N*-(2: 4-Dinitro-phenyl)-*sulfanilic* Acid** (*C. A. nomen.*)

See 2: 4-Dinitro-diphenylamine-4′-sulfonic Acid

Dinitro-stilbene-disulfonic Acid

4: 4′-Dinitro-stilbene-2: 2′-disulfonic Acid (*C. A. nomen.*)



$$O_2N\text{-}C_6H_3(SO_3H)\text{-}CH:CH\text{-}C_6H_3(SO_3H)\text{-}NO_2 = C_{14}H_{10}N_2O_{10}S_2 = 430$$

Statistics.—Manufactured '19:— ?

Formation.—*p*-Nitro-toluene-sulfonic acid is dissolved in weak caustic soda solution and oxidized with sodium hypochlorite solution. If the product contains dinitro-dibenzyl-disulfonic acid, it is again oxidized with sodium hypochlorite in caustic soda solution.

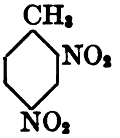
Literature.—Cain, Intermediate Products (2d Ed.), 39
Lange, Zwischenprodukte, #1453

Dyes Derived from Dinitro-stilbene-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Stilbene Dyes			
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M'20:— ?	Dinitro-stilbene-disulfonic Acid (2 mols)	D
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	Dinitro-stilbene-disulfonic Acid (2 mols) [Reduction]	D
12	Diphenyl Citronine G		Aniline (2 mols)	D
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	*p*-Phenylene-diamine (2 mols)	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydrothio-toluidine-sulfonic Acid (2 mols) *or* Primuline-sulfonic Acid (2 mols)	D

2:4-Dinitro-toluene (*C. A. nomen.*)

m-Dinitro-toluene



$=C_7H_6N_2O_4=182$

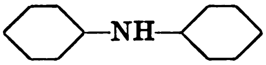
STATISTICS.—Imported '14:—547,701
Manufactured '18:— ?
Manufactured '19:—746,266
Manufactured '20:—1,847,191

FORMATION.—From toluene by nitration with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 34
Lange, Zwischenprodukte, #789

USES.—For manufacture of *m*-tolylene-diamine

Diphenylamine



$=C_{12}H_{11}N=169$

STATISTICS.—Imported '14:—81,137
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By heating aniline and aniline hydrochloride together in an autoclave, provided with a replaceable acid-proof enamelled lining

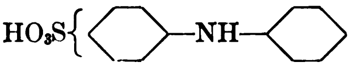
LITERATURE.—Cain, Intermediate Products (2d Ed.), 72
Lange, Zwischenprodukte, #1598–1600

Dyes Derived from Diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediated Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
134	Metanil Yellow	I '14:—284,606 M '17:— ? M '18:— ? M '19:—477,143 I '20:— 8,456 M '20:—629,437	Metanilic Acid	A
135	Metanil Yellow, Brominated		Metanilic Acid [Bromination]	A
136	Acid Yellow MGS, GG		Metanilic Acid [Sulfonation]	A
139	Orange IV	I '14:— 19,020 M '19:— ? I '20:— 608	Sulfanilic Acid	A
140	Azoflavine RS Curcumeine	I '14:— 39,869 I '20:— 5,225	Sulfanilic Acid [Nitration]	A
141	Azo Yellow 3G	I '14:—114,689 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,818 M '20:— ?	Sulfanilic Acid [Nitration]	A
142	Brilliant Yellow S Curcumine	I '14:— 9,934	Sulfanilic Acid [Sulfonation]	A
150	Fast Yellow N		*p*-Toluidine-*o*-sulfonic Acid	A
203	Yellow Fast To Soap		*m*-Amino-benzoic Acid	M

Diphenylamine-sulfonic Acid

Anilino-*b*enzene-sulfonic Acid (*C. A. nomen.*)



$=C_{12}H_{11}NO_3S=249$

FORMATION.—By sulfonation of diphenylamine, and purification from the disulfonate formed simultaneously

LITERATURE.—Schultz, Die Chemie des Steinkohlentheers (3 aufl.), **1**, 181

Lange, Zwischenprodukte, #1615–1617

Dyes Derived from Diphenylamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
538	Methyl Blue Cotton Blue	I '14:— 50,255	Diphenylamine-sulfonic Acid (3 mols)	B

Diphenylene-imide

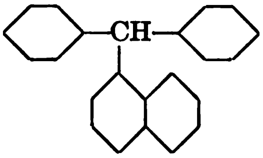
See, Carbazole

Diphenyl-methyl-amine

See, *N*-Methyl-*d*iphenylamine (*C. A. nomen.*)

Diphenyl-naphthyl-methane

1-Naphthyl-diphenyl-*m*ethane (*C. A. nomen.*)



$=C_{23}H_{18}=294$

FORMATION.—From benzo-hydrol by heating with naphthalene and P_2O_5 at 140°–145° for some hours

LITERATURE.—A. Lehne, Ueber die Condensation von Benzhydrol und Naphthalin, Ber, **13**, 358 (1880)

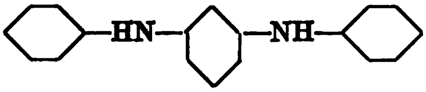
Richter, Lex. d. Kohlenstoff Verbindungen, 4193

Dye Derived from Diphenyl-naphthyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
565	Acid Blue B Wool Blue G	I '14:—180,423 I '20:— 1,852 M '20:— ?	[Sulfonation]	A

N:*N'*-Diphenyl-*m*-phenylene-diamine (*C. A. nomen.*)

s-Diphenyl-*m*-phenylene-diamine



$=C_{18}H_{16}N_2=260$

FORMATION.—From resorcinol and aniline by heating together in presence of calcium chloride and a little zinc chloride at 210°

LITERATURE.—Green, Organic Coloring Matters (1908), 37
Cf. Schultz, Farbstofftabellen, #689

Dyes Derived from *N*:*N'*-Diphenyl-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
267	Phenylene Black		1-Naphthylamine-4:7-disulfonic Acid α-Naphthylamine	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	Freund's Acid α-Naphthylamine	A
	AZINE DYE			
689	Indazine M		Nitroso-dimethylaniline (1 and 2 mols)	B

Diphenyl-thiourea

See, Thio-carbanilide (*C. A. nomen.*)

Disulfo Acid C

2-Naphthylamine-4: 8-disulfonic Acid (*not considered herein*)

Disulfo Acid E

See, 1-Naphthol-3: 8-disulfonic Acid

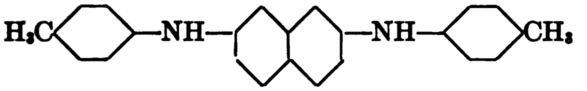
Disulfo Acid F

2-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

Disulfo Acid S

See, 1-Naphthylamine-4: 8-disulfonic Acid

N: N′-(p: p′-Ditolyl)-2: 7-naphthylene-diamine



$=C_{24}H_{22}N_2=338$

FORMATION.—By heating 2: 7-dihydroxy-naphthalene with *p*-toluidine and *p*-toluidine hydrochloride

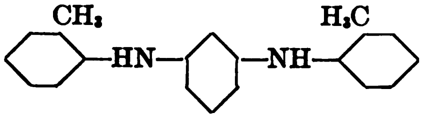
LITERATURE.—Green, Organic Coloring Matters (1908), 38
Lange, Zwischenprodukte, #2886

Dye Derived from *N*: *N′*-(*p*: *p′*-Ditolyl)-2: 7-naphthylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
677	AZINE DYE Basle Blue R		Nitroso-dimethyl-aniline	B

N: *N'*-(*o*: *o'*-**Ditolyl**)-*m*-*p*hen**ylene-diamine** (*C. A. nomen.*)

Di-*o*-tolyl-*m*-phenylene-diamine



$= C_{20}H_{20}N_2 = 288$

FORMATION.—Presumably by heating resorcinol with *o*-toluidine in presence of condensing agent. *Cf.* Di-*p*-tolyl-*m*-phenylene-diamine

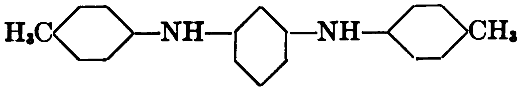
LITERATURE.—Ullmann, Enzy. tech. Chemie, **9**, 63

Dye Derived from *N*: *N'*-(*o*:*o'*-Ditolyl)-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
691	AZINE DYE Metaphenylene Blue B	I '14:— 50	Nitroso-dimethyl-aniline	B

N: *N'*-(*p*: *p'*-**Ditolyl**)-*m*-*p*h**enylene-diamine** (*C. A. nomen.*)

Di-*p*-tolyl-*m*-phenylene-diamine



$= C_{20}H_{20}N_2 = 288$

FORMATION.—From resorcinol, *p*-toluidine, and *p*-toluidine hydrochloride by heating together in presence of calcium chloride and a little zinc chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **9**, 63
Green, Organic Coloring Matters (1908), 37

Dye Derived from *N*: *N'*-(*p*: *p'*-Ditolyl)-*m*-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
690	AZINE DYE Diphene Blue R Metaphenylene Blue R	I '20:— 3,124	Dimethyl-*p*-phenylene-diamine	B

D S

See, Diamino-stilbene-disulfonic Acid

D T

See, Dehydro-thio-*p*-toluidine-sulfonic Acid

Ebert and Merz α Acid

See, Naphthalene-2: 7-disulfonic Acid

Ebert and Merz β Acid

Naphthalene-2: 6-disulfonic Acid (*not considered here*)

Epsilon Acid

See, 1-Naphthol-3: 8-disulfonic Acid

See, 1-Naphthylamine-3: 8-disulfonic Acid

and 1: 8-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

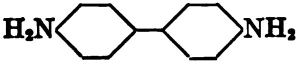
Erdmann's μ Acid

See, 1-Naphthylamine-6-sulfonic Acid

Ethoxy-benzidine

Di-*p*-amino-ethoxy-diphenyl

2-Ethoxy-*b*enzidine (*C. A. nomen.* $NH_2=1$)



$=C_{14}H_{16}N_2O=228$

Formation.—Aniline is diazotized and coupled with phenol-*p*-sulfonic acid and the product ethylated with ethyl bromide, thus forming,—benzene-azo-phenetole-sulfonic acid. This is then reduced in an aqueous solution with zinc dust and caustic soda followed by acidification with hydrochloric acid, resulting in preparation of ethoxy-benzidine-sulfonic acid which is heated in an autoclave with water (at 170°) to split out the sulfonic acid group

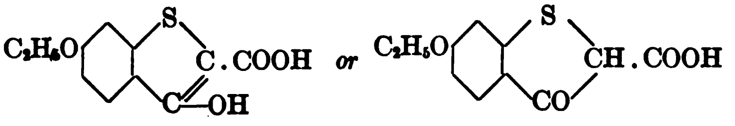
Literature.—Weinberg, Ber. 20, 3171
Lange, Zwischenprodukte, #1224, 1249
Heumann, Anilinfarben 4, 380

Dyes Derived from Ethoxy-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes			
401	Diamine Blue 3R		Nevile-Winther's Acid (2 mols)	D
402	Diamine Blue Black E		2-Naphthol-3:7-disulfonic Acid Gamma Acid	D
403	Diamine Black BO		Gamma Acid (2 mols)	D
404	Diamine Yellow N	M '17:— ? I '20:— 313	Salicylic Acid Phenol [Ethylation]	D

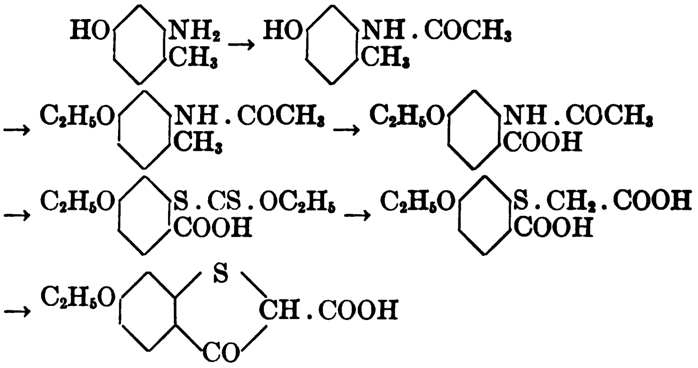
5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

6-Ethoxy-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)



$=C_{11}H_{10}O_4S=238$

FORMATION.—5-Hydroxy-*o*-toluidine (amino-*p*-cresol) is acetylated to protect the amino group, and then ethylated with diethyl-sulfate for example. The resulting 2-acetamido-4-ethoxy-toluene is oxidized with potassium permanganate to 2-acetamido-4-ethoxy-benzoic acid. The acetyl group is split off by boiling with caustic soda, acid added, and the amino group diazotized with sodium nitrite, and reacted with potassium xanthate. This xanthate compound, upon being treated with sodium chloro-acetate and caustic soda, yields 5-ethoxy-phenyl-thioglycol-*o*-carboxylic acid. This latter heated with caustic soda condenses to 5-ethoxy-2-hydroxy-thionaphthene-1-carboxylic acid. The successive reaction steps are as follows:—



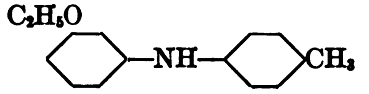
LITERATURE.—Lange, Zwischenprodukte, #2167, 2168
Georgievics and Grandmougin, Dye Chemistry, 437

Dyes Derived from 5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
913	Helindone Orange R	I '14:— 14,511 I '20:— 3,155	5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid (2 mols)	V
915	Helindone Fast Scarlet R	I '14:— 4,302 I '20:— 3,748	5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid (2 mols) [Bromination]	V

3-Ethoxy-4′-methyl-*d*iphenylamine (*C. A. nomen.*)

3-Ethoxy-phenyl-4′-tolyl-amine



$= C_{15}H_{17}NO = 227$

FORMATION.—100 parts of *m*-hydroxy-phenyl-*p*-tolyl-amine, 20.5 parts of caustic soda solution (40° ?), 200 parts of alcohol, and 75 parts of ethyl chloride are heated together in an autoclave at 110–120° for 7–8 hours

LITERATURE.—Lange, Zwischenprodukte, #1624, 1625

Dye Derived from 3-Ethoxy-4′-methyl-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
548	Acid Violet 6BN	I '14:— 6,861 I '20:— 5,582	Ketone [Sulfonation]	A

2-Ethoxy-1-*n*aphthylamine (*C. A. nomen.*)

See, 1-Amino-2-naphthol Ethyl Ether

3-Ethylamino-4-methyl-diphenylamine

See, N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine

7-Ethylamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-2-naphthylamine-7-sulfonic Acid

2-Ethylamino-8-naphthol-6-sulfonic Acid

See, Ethyl-gamma Acid

7-Ethylamino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)

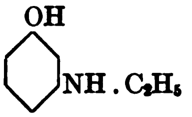
See, Ethyl-gamma Acid

Ethyl-amino-naphthol-sulfonic Acid γ

See, Ethyl-gamma Acid

m-Ethylamino-$p$henol (*C. A. nomen.*)

Ethyl-m-amino-phenol



$=C_8H_{11}NO=137$

FORMATION.—Ethyl-aniline is sulfonated with 23 per cent oleum, the sodium ethyl-aniline-m-sulfonate isolated and fused with caustic potash for ten hours at 200–220°

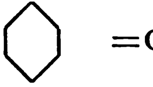
LITERATURE.—Cain, Intermediate Products (2d Ed.), 120
Lange, Zwischenprodukte, #593–595

Dyes Derived from m-Ethylamino-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
571	Rhodamine 6G	I '14:— 37,515 I '20:— 8,574	m-Ethylamino-phenol (2 mols) Phthalic anhydride [Ethyl esterification]	B
577	Rhodine 2G		Dimethylamino - hydroxy - benzoyl - benzoic Acid [Ethyl esterification]	B

N-Ethyl-aniline (*C. A. nomen.*)

Ethyl-aniline



$=C_8H_{11}N=121$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—195,161
Manufactured '20:— ?

FORMATION.—By heating aniline hydrochloride and ethyl alcohol together in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 67
Lange, Zwischenprodukte, #93

USES.—For preparation of ethyl-methyl-aniline and benzyl-ethyl-aniline

a-(*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

See, Ethyl-sulfobenzyl-aniline

Ethyl-benzyl-aniline

See, Benzyl-ethyl-aniline

Ethyl-benzyl-aniline-sulfonic Acid

See, Ethyl-sulfobenzyl-aniline

2:2'-Ethylene-bis (5-nitro-benzene-sulfonic Acid) (*C. A. nomen.*)

See, Dinitro-dibenzyl-disulfonic Acid

Ethyl-F Acid

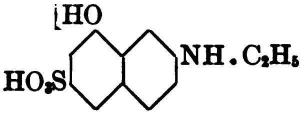
See, Ethyl-2-naphthylamine-7-sulfonic Acid

Ethyl-gamma Acid

2-Ethylamino-8-naphthol-6-sulfonic Acid

Ethylamino-naphthol-sulfonic Acid γ

7-Ethylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$=C_{12}H_{13}NO_4S=267$

FORMATION.—G acid (2-naphthol-6: 8-disulfonic acid) is heated with ethylamine in an autoclave at about 200°. The ethylamino-G acid thus obtained is fused with caustic soda at 210-220°, and the ethyl-gamma acid isolated

LITERATURE.—Lange, Zwischenprodukte, #2550

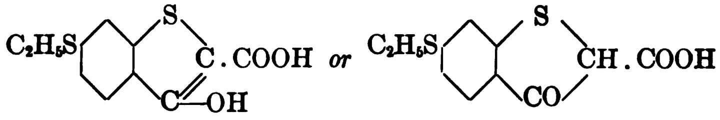
Dye Derived from Ethyl-gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
334	DISAZO DYE Diphenyl Blue Black	I '14:— 26,240	H Acid Benzidine	D

5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C A. nomen.*)

5-Ethylthio-2-hydroxy-thionaphthene-1-carboxylic Acid

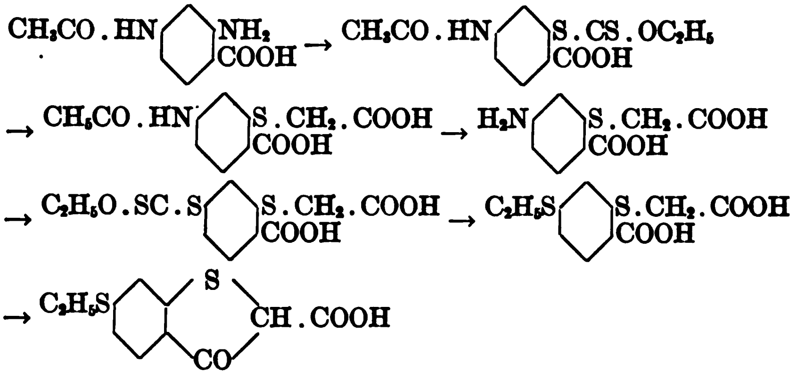
6-Ethylthio-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)



$= C_{11}H_{10}O_3S_2 = 254$

FORMATION.—4-Acetamido-anthranilic acid is diazotized and treated with potassium xanthate. This xanthate compound is reacted with chloro-acetic acid and then hydrolyzed to split the acetyl group from the 4-amino radical. This amino group is now diazotized and reacted with potassium xanthate. This second xanthate compound is treated with ethyl-sulfate, resulting in the formation of 5-ethylmercapto-phenyl-thioglycol-*o*-carboxylic acid. This latter, upon being heated with caustic soda, condenses to 5-ethylmercapto-

2-hydroxy-thionaphthene-1-carboxylic acid. The successive reaction steps are as follows:—



Lɪᴛᴇʀᴀᴛᴜʀᴇ.—Georgievics and Grandmougin, Dye Chemistry, 436–437
Lange, Zwischenprodukte, #2175

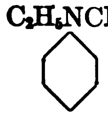
Dye Derived from 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
916	Iɴᴅɪɢᴏ Gʀᴏᴜᴘ Dʏᴇs Helindone Scarlet S	I '14:— 5,515 I '20:— 56	5-Ethylmercapto-2-hydroxy-thionaphthene 1-carboxylic Acid (2 mols)	

N-Ethyl-N-methyl-aniline (*C. A. nomen.*)

Ethyl-methyl-aniline

Methyl-ethyl-aniline



$C_2H_5NCH_3$ $= C_9H_{13}N = 135$

Fᴏʀᴍᴀᴛɪᴏɴ.—From ethyl-aniline by methylation, or from methyl-aniline by ethylation

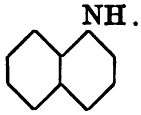
Lɪᴛᴇʀᴀᴛᴜʀᴇ.—Beil. II, 334

Dye Derived from Ethyl-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
661	Thiazine Dye Thionine Blue GO	I '14:— 18,618 I '20:— 2,030	Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid [Oxidation, etc.] *or* Nitroso-dimethyl-aniline [Reduction, Oxidation, $Na_2S_2O_3$, etc.] *or* Dimethyl-*p*-phenylene-diamine [$Na_2S_2O_3$, Oxidation, etc.] *or* Dimethyl-aniline [$Na_2S_2O_3$, etc.]	B

Ethyl-α-naphthylamine

N-Ethyl-1-*n*aphthylamine (*C. A. nomen.*)



$=C_{12}H_{13}N=171$

Statistics.—Imported '14:—1,102 lbs.

Formation.—By treating α-naphthylamine with ethyl bromide

Literature.—Limpricht, Ann. **99**, 117 (1856)
Friedlaender and Welmans, Ber. **21**, 3124 (1888)
Bamberger and Helwig, Ber. **22**, 1315 (1889)
Thorpe, Dic. Chemistry, **3**, 587

Dyes Derived from Ethyl-α-naphthyl-amine

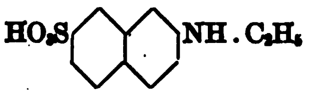
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
	MONOAZO DYE			
186	Lanacyl Violet B	I '14:— 3,628 M '17:— ? M'18:— ?	H Acid	A
	DIPHENYL-NAPHTHYL-METHANE-DYE			
558	Victoria Blue R	I '14:— 4171 I '20:— 97	Hydrol *or* Ketone	B

Ethyl-2-naphthylamine-7-sulfonic Acid

Ethyl-F Acid

Ethyl-β-naphthylamine-δ-sulfonic Acid

7-Ethylamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{12}H_{13}NO_3S = 251$

FORMATION.—By ethylation of 2-naphthylamine-7-sulfonic acid by means of an ethyl halide or sodium ethyl sulfate, in an autoclave at 100–110° C. for several hours

LITERATURE.—Lange, Zwischenprodukte, #2385

Dyes Derived from Ethyl-2-naphthylamine-7-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
231	Cloth Red 3B Extra	I '14:— 15 I '20:— 84	*o*-Amino-azo-toluene	M
371	Roseazurine G		Tolidine 2-Naphthylamine-7-sulfonic Acid	D
372	Rosazurine B		Tolidine Ethyl-2-naphthyl-amine-7-sulfonic Acid (2 mols)	D

Ethyl-β-naphthylamine-δ-sulfonic Acid

See, Ethyl-2-naphthylamine-7-sulfonic Acid

***N*-Ethyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, *p*-Nitroso-ethyl-aniline

***N*-Ethyl-4-nitroso-*o*-*t*oluidine** (*C. A. nomen. NHR* = *1*)

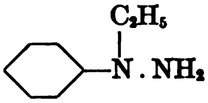
See, Nitroso-ethyl-*o*-toluidine

***N*-Ethyl-*N*-phenyl-*b*enzylamine** (*C. A. nomen.*)

See, Benzyl-ethyl-aniline

Ethyl-phenyl-hydrazine

α-Ethyl-α-phenyl-*h*ydrazine (*C. A. nomen.*)



$= C_8H_{12}N_2 = 136$

FORMATION.—Phenyl-hydrazine is treated with metallic sodium to form the sodium compound, from which by means of ethyl iodide the ethyl-phenyl-hydrazine is prepared

LITERATURE.—Thorpe, Dic. Chemistry, **3**, 53

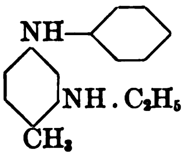
Dye Derived from Ethyl-phenyl-hydrazine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
130	MONOAZO DYE Chromazone Blue R		*p*-Amino-benzaldehyde Chromotropic Acid	M

N^3-Ethyl-N^1-phenyl-4-*m*-*t*olylene-diamine (*NH_2, =1, C. A. nomen.*)

Phenyl-*p*-amino-ethyl-*o*-toluidine (*$CH_3 = 1$*)

3-Ethylamino-4-methyl-diphenylamine



$= C_{15}H_{18}N_2 = 226$

FORMATION.—N^1-Phenyl-4-*m*-tolylene-diamine (*q.v.*) is heated for ten hours with ethyl bromide at 150–175°

LITERATURE.—Ger. Pat. 87,667, Frdl. IV, 85
Beilstein, Organische Chemie (3 auf.), IV spl. 400
Lange, Zwischenprodukte, #1750, 1755, referring to the same patent, gives a different formula

Dye Derived from N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine

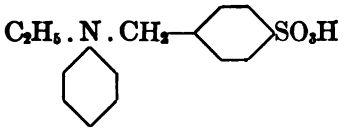
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates sed and Notes*	*Dye Application Class*
684	AZINE DYE Brilliant Rhoduline Red		Nitroso-ethyl-*o*-toluidine	B

Ethyl-sulfobenzyl-aniline

Benzyl-ethyl-aniline-sulfonic Acid

Ethyl-benzyl-aniline-sulfonic Acid

α-(*N*-Ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{15}H_{17}NO_3S = 291$

STATISTICS.—Manufactured 1919 and 1920, but in undisclosed quantities

FORMATION.—By sulfonation of benzyl-ethyl-aniline with 20 per cent oleum at 40–50°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 69
Cf. Lange, Zwischenprodukte, #1500

Dyes Derived from Ethyl-sulfobenzyl-aniline

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	MONOAZO DYE			
50	Azo Cardinal G	M '14:— ?	*p*-Nitro-aniline	A
	TRIPHENYL-METHANE DYES			
502	Guinea Green Acid Green 2BG	I '14:— 49,971 M '17:— ? M '18:— ? M '19:— ? I '20:— 278 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) Benzaldehyde [Oxidation]	A
503	Night Green A Neptune Green Brilliant Milling Green B	I '14:— 40,868 M '19:— ? I '20:— 10,940 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) *o*-Chloro-benzaldehyde [Oxidation]	A
506	Erioglaucine	I '14:— 66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) Benzaldehyde-*o*-sulfonic Acid [Oxidation]	A
529	Acid Violet 6B		Ethyl-sulfobenzyl-aniline (2 mols) Dimethyl-*p*-amino-benzaldehyde [Oxidation]	A
530	Acid Violet 6B Formyl Violet Guinea Violet	I '14:—161,624 M '17:— ? M '18:— ? M '19:— ? I '20:— 3,925 M '20:—144,207	Diethyl-aniline Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
	THIAZINE DYE			
662	Thiocarmine R	I '14:— 1,399	Ethyl-sulfobenzyl-*p*-phenylene-diamine [$Na_2S_2O_3$, etc.]	A

N-Ethyl-N-(p-sulfo-benzyl)-metanilic Acid (*C. A. nomen.*)

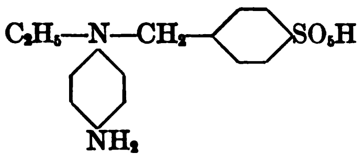
See, Benzyl-ethyl-aniline-disulfonic Acid

Ethyl-sulfobenzyl-p-phenylene-diamine

Benzyl-ethyl-p-phenylene-diamine-sulfonic Acid

p-Amino-benzyl-ethyl-aniline-sulfonic Acid

a-(p-Amino-N-ethyl-anilino)-p-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{15}H_{18}N_2O_3S = 306$

FORMATION.—Benzyl-ethyl-aniline-sulfonic acid is changed into the nitroso-derivative with nitrous acid, and this latter is reduced with sulfite

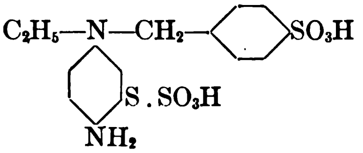
LITERATURE.—Lange, Zwischenprodukte, #1499, 929
Cf. Cain, Intermediate Products (2d Ed.), 69

Dye Derived from Ethyl-sulfobenzyl-p-phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
662	THIAZINE DYE Thocarmine R	I '14:— 1,399	Ethyl-sulfobenzyl-aniline [$Na_2S_2O_3$, etc.]	A

Ethyl-sulfobenzyl-p-phenylene-diamine-thiosulfonic Acid

a-(4-Amino-N-ethyl-3-sulfomercapto-anilino)-p-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{15}H_{18}N_2O_6S_3 = 418$

FORMATION.—Ethyl-sulfobenzyl-*p*-phenylene-diamine is dissolved in dilute hydrochloric acid, zinc chloride solution and sodium thiosulfate solution added; and then oxidized quickly with solution of sodium bichromate

LITERATURE.—Lange, Zwischenprodukte, #1501

Dye Derived from Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
667	THIAZINE DYE Brilliant Alizarin Blue Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	1:2-Naphthoquinone	M

5-Ethylthio-2-hydroxy-thionaphthene-1-carboxylic Acid

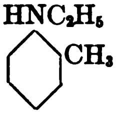
See, 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

6-Ethylthio-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)

See, 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

***N*-Ethyl-*o*-toluidine** (*C. A. nomen.*)

Ethyl-*o*-toluidine



$= C_9H_{13}N = 135$

FORMATION.—From *o*-toluidine hydrochloride and ethyl alcohol by heating together in an autoclave at about 200°. The crude product contains considerable *o*-toluidine, which can be removed as sulfate by adding just sufficient sulfuric acid to combine with it, allowing to cool, and centrifugating

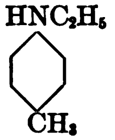
LITERATURE.—Cain, Intermediate Products (2d Ed.), 71
Lange, Zwischenprodukte, #128

Dyes Derived from *N*-Ethyl-*o*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermedictes Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
500	Setocyanine O	I '14:— 923 I '20:— 1,102	Ethyl-*o*-toluidine (2 mols) *o*-Chloro-benzaldehyde [Oxidation]	B
546	Cyanol	I '14:— 40,015 I '20:— 7,954	Ethyl-*o*-toluidine (2 mols) *m*-Hydroxy-benzaldehyde [Sulfonation, Oxidation]	A
	THIAZINE DYE			
663	New Methylene Blue N	I '14:— 30,392 I '20:— 513	Ethyl-*o*-toluidine (2 mols) [Nitroso-derivative, $Na_2S_2O_3$, etc.] *or* *p*-Amino-ethyl-*o*-toluidine [$Na_2S_2O_3$, etc.]	B

N-Ethyl-*p*-toluidine (*C. A. nomen.*)

Ethyl-*p*-toluidine



$= C_9H_{13}N = 135$

FORMATION.—From *p*-toluidine hydrochloride and ethyl alcohol by heating together in an autoclave and purification of resulting product

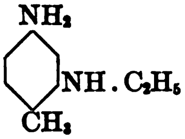
LITERATURE.—*Cf.* Cain, Intermediate Products (2d Ed.), 71
Lange, Zwischenprodukte, #128
Ger. Pat. 21,241, Frdl. **1**, 21

Dye Derived from *N*-Ethyl-*p*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
671	AZINE DYE Induline Scarlet	I '14:— 198 I '20:— 154	α-Naphthylamine	

N^3-Ethyl-4-*m*-tolylene-diamine (*C. A. nomen.* $NH_2=1$)

p-Amino-ethyl-*o*-toluidine ($CH_3=1$)



$=C_9H_{14}N_2=150$

FORMATION.—From 5-nitro-ethyl-*o*-toluidine ($NH_2=1$) [4-nitro-ethyl-*o*-toluidine ($CH_3=1$)] by reduction with zinc dust and hydrochloric acid

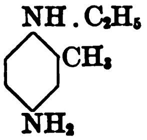
LITERATURE.—Beilstein, Organische Chemie (3 auf.), IV, 601
J. Chem. Soc., **67**, 247

Dye Derived from N^3-Ethyl-4-*m*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
684	AZINE DYE Brilliant Rhoduline Red		Methyl-*o*-toluidine Aniline	B

N^1-Ethyl-*p*-tolylene-diamine (*C. A. nomen.*)

p-Amino-ethyl-*o*-toluidine



$=C_9H_{14}N_2=150$

Formation.—From 4-nitroso-ethyl-*o*-toluidine (NHR= 1) by reduction with $SnCl_2$+HCl

Literature.—Beil. II, 609

Dye Derived from N^1-Ethyl-*p*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
663	Thiazine Dye New Methylene Blue N	I '14:— 30,392 I '20:— 513	Ethyl-*o*-toluidine [$Na_2S_2O_3$]	B

Ewer and Pick's Acid

See, Naphthalene-1: 6-disulfonic Acid

F Acid

See, 2-Naphthol-7-sulfonic Acid
See, 2-Naphthylamine-7-sulfonic Acid

2-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

2-Amino-7-naphthol-3-sulfonic Acid (*not considered herein*)

2: 7-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

Formaniline

See, Anhydro-formaldehyde-aniline

4-Formyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

See, Benzaldehyde-disulfonic Acid

***o*-Formyl-benzene-sulfonic Acid** (*C. A. nomen.*)

See, Benzaldehyde-*o*-sulfonic Acid

4-Formyl-6-methyl-*m*-benzene-disulfonic Acid

See, 3-methyl-benzaldehyde-4: 6-disulfonic Acid

Forsling's Acid I

See, 2-Naphthylamine-8-sulfonic Acid

Forsling's Acid II

See, 2-Naphthylamine-5-sulfonic Acid

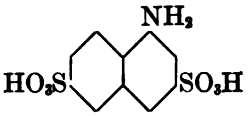
Freund's Acid

1-Naphthylamine-3: 6-disulfonic Acid

4-Amino-2: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

α-Naphthylamine-α-disulfonic Acid

Alén's α Acid



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Imported '14:—5,246 lbs.
Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—Naphthalene is heated with five parts of concentrated sulfuric acid for about 8 hours at 160–200°, the mixture is cooled and two parts of 50 per cent nitric acid are added. After reacting for some time the nitration mass is diluted and reduced with iron

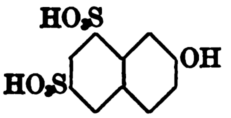
LITERATURE.—Cain, Intermediate Products (2d Ed.), 195
Thorpe, Dic. Chemistry, **3**, 592
Lange, Zwischenprodukte, #2591

Dyes Derived from Freund's Acid

Schultz Number Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
266	Naphthylamine Black D	I '14:—152,141 M '17:— ? M '18:— 29,724 M '19:— ? I '20:— 1,687 M '20:— ?	α-Naphthylamine (2 mols)	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	α-Naphthylamine Diphenyl-*m*-phenylene-diamine	A

G Acid[1]

2-Naphthol-6: 8-disulfonic Acid (*C. A. nomen.*)
β-Naphthol-β-disulfonic Acid
β-Naphthol-γ-disulfonic Acid
β-Naphthol-disulfonic Acid G
β-Naphthol-disulfonic Acid γ
Y Acid



$=C_{10}H_8O_7S_2=304$

Statistics.—Imported 14':—11,624 lbs.
Manufactured '18:— ?
Manufactured '19:—732,192 lbs.
Manufactured '20:—1,446,605 lbs.

Formation.—Sulfonation of β-naphthol and separation from the R acid simultaneously formed

Literature.—Cain, Intermediate Products (2d Ed.), 227
Thorpe, Dic. Chemistry, **3**, 627
Lange, Zwischenprodukte, #2659–2661

Dyes Derived from G Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
38	Orange G	I '14:— 48,456 M '17:— ? M '18:— ? M '19:— ? I '20:— 100 M '20:—120,874	Aniline	A

---

[1] Occasionally in the old literature G acid is used to mean Gamma acid (or 2-Amino-8-naphthol-6-sulfonic acid), or 2-Naphthylamine-6: 8-disulfonic acid, or 1: 7-Dihydroxy-naphthalene-3-sulfonic acid.

Dyes Derived from G Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
113	Crystal Ponceau	I '14:— 628	α-Naphthylamine	A
122	Erica G	I '14:— 2,370 M '18:— ? I '20:— 1,142	Dehydro-thio-*m*-xylidine	D
169	Cochineal Red A	I '14:— 32,645 M '17:— ? M '18:— ? M '19:—231,519 M '20:—288,945	Naphthionic Acid	A
	DISAZO DYES			
227	Brilliant Croceine M	I '14:—125,137 M '17:— ? M '18:— 84,643 M '19:—157,509 I '20:— 49 M '20:—129,124	Amino-azo-benzene	A
270	Brilliant Croceine 9B		Amino-G Acid Aniline R Acid	A
319	Diamine Scarlet B	I '14:— 41,175 I '20:— 10,565	Benzidine Phenol [Ethylation]	D
	DIPHENYL-NAPHTHYL-METHANE DYE			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	Hydrol	A

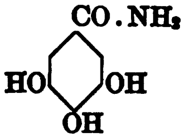
Gallamic Acid

See, Gallamide (*C. A. nomen.*)

Gallamide (*C. A. nomen.*)

Gallamic Acid

Gallic Acid Amide



$=C_7H_7NO_4=169$

Formation.—From tannin by boiling with strong solution of ammonium sulfite and aqueous ammonia until the excess of ammonia has been driven off. The amide crystallizes out upon cooling

Literature.—Green, Organic Coloring Matters (1908), 46
Lange, Zwischenprodukte, #1546

Dyes Derived from Gallamide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Oxazine Dyes			
627	Modern Cyanine		Nitroso-dimethyl-aniline Dimethyl-*p*-phenylene-diamine [Reduction]	M
630	Cyanazurine		Nitroso-dimethyl-aniline Aniline [Reduction]	M
637	Gallamine Blue	I '14:— 2,756 I '20:— 16,446	Nitroso-dimethyl-aniline	M
638	Amido Gallamine Blue		Nitroso-dimethyl-aniline [Ammonia, Reduction]	M
641	Coreine RR Coelestine Blue B	I '14:— 1,320 I '20:— 44	Nitroso-diethyl-aniline *or* Diethylamino-azo-benzene	M
646	Coreine AR		Nitroso-diethyl-aniline *or* Diethylamino-azo-benzene Aniline [Sulfonation] *or* [Coreine RR; Aniline; Sulfonation]	M

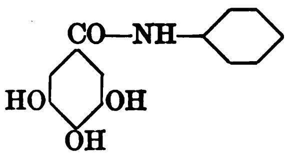
Gallanilic Acid

See, Gallanilide (*C. A. nomen.*)

Gallanilide (*C. A. nomen.*)

Gallanilic Acid

Gallic Acid Anilide



$=C_{13}H_{11}NO_4=245$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From tannin by heating with aniline

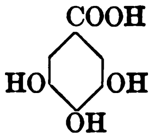
LITERATURE.—Green, Organic Coloring Matters (1908), 46
Cf. Lange, Zwischenprodukte, #1546

Dye Derived from Gallanilide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
639	OXAZINE DYE Gallanilic Violet R, B		Nitroso-dimethyl-(*or* diethyl-) aniline	M

Gallic Acid

3:4:5-Trihydroxy-benzoic Acid



$=C_7H_6O_5=170$

STATISTICS.—Imported '14:—61,644 lbs.
Manufactured regularly, but in amounts that are not yearly disclosed

FORMATION.—From nut galls (Chinese or Aleppo) by action of ferments or acids, and subsequent extraction and crystallization

LITERATURE.—Green, Organic Coloring Matters (1908), 46
Lange, Zwischenprodukte, #1112

Dyes Derived from Gallic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 5,075 M '20:— ?	Phthalic Anhydride Gallic Acid (2 mols)	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Phthalic Anhydride Gallic Acid (2 mols) [Dehydration] *or* [Galleine dehydrated]	M
	OXAZINE DYES			
622	Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 I '20:— 29,643 M '20:— 76,719	Nitroso-dimethylaniline Aniline [Sulfonation] *or* [Gallocyanine, Aniline, Sulfonation]	M
624	Modern Violet N	I '20:— 5,688	Nitroso-dimethylaniline [CO_2 split off] *or* [Gallocyanine heated]	M
625	Chrome Heliotrope		Nitroso-methyl-aniline [Reduction]	M
626	Gallocyanine	I '14:— 78,253 M '17:— ? M '18:—435,460 M '19:—365,243 I '20:— 12,414 M '20:— 70,169	Nitroso-dimethylaniline	M

Dyes Derived from Gallic Acid *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
628	Gallocyanine MS	I '20:— 22	Dimethylamino-azo-benzene-disulfonic Acid *or* Nitroso-dimethyl-aniline [Sulfonation; Oxidation]	M
629	Gallogreen DH Modern Blue		Nitroso-dimethyl-aniline [Formaldehyde, Reduction] *or* [Gallocyanine, Formaldehyde, Reduction]	M
631	Chromocyanine V	M '18:— ? M '19:— ? I '20:— 1,287 M '20:— ?	Nitroso-dimethyl-aniline [Sulfonation] *or* [Gallocyanine, Sulfites]	M
632	Ultra Violet LGP	I '14:— 4,368	Nitroso-dimethyl-aniline (2 mols) Gallic Acid (2 mols)	M
633	Indalizarine R	I '20:— 551	Nitroso-dimethyl-aniline [Sulfonation]	M
634	Indalizarine Green		Nitroso-dimethyl-aniline [Sulfonation; Nitration] *or* [Indalizarine nitrated]	M
635	Blue 1900 TC Modern Violet	I '20:— 1,933	Nitroso-dimethyl-aniline [Reduction]	M

Dyes Derived from Gallic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
642	Phenocyanine TC	I '20:— 4,740	Nitroso-dimethylaniline Resorcinol *or* [Gallocyanine, Resorcinol]	M
643	Phenocyanine TV	M '17:— ? I '20:— 1,543	Nitroso-dimethylaniline Resorcinol [Sulfonation] *or* [Phenocyanine sulfonated]	M
644	Ultracyanine B		Nitroso-dimethylaniline Resorcinol [Alkaline Condensation] *or* [Gallocyanine; Resorcinol; Alkaline Condensation]	M
645	Gallazine A		Nitroso-dimethylaniline Schaeffer's Acid [Oxidation] *or* [Gallocyanine, Schaeffer's Acid Oxidation]	M
	THIAZINE DYE			
664	Leuco-gallo Thionine DH		Dimethyl-*p*-phenylenediamine-thiosulfonic Acid	M

Dyes Derived from Gallic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
772	Galloflavine W	I '14:— 838 I '20:— 24	Gallic Acid (2 mols)	M
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Benzoic Acid *or* Phthalic Anhydride	M

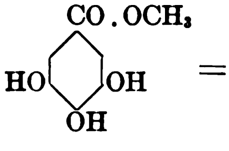
Gallic Acid Amide

See, Gallamide (*C. A. nomen.*)

Gallic Acid Anilide

See, Gallanilide (*C. A. nomen.*)

Gallic Acid Methyl Ester



$= C_8H_8O_5 = 184$

FORMATION.—From gallic acid by heating with methanol (methyl alcohol) and hydrochloric acid

LITERATURE.—Green, Organic Coloring Matters (1908), 46

Dyes Derived from Gallic Acid Methyl Ester

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
636	Prune	I '14:— 3,197 I '20:— 4,418	Nitroso-dimethyl-aniline	M
640	Modern Azurine DH		Nitroso-dimethyl-aniline Aniline	M

Gamma Acid

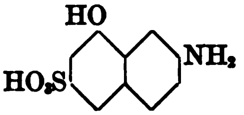
2-Amino-8-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid γ

Amino-naphthol-sulfonic Acid G

G Acid (*occasionally in old literature*)

7-Amino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_4S=239$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:—155,025 lbs.
Manufactured '20:—418,456 lbs.

FORMATION.—β-Naphthol is sulfonated to R and G acids, and these two β-naphthol-disulfonic acids are separated. The sodium salt of G acid is heated in an autoclave with ammonia and sodium bisulfite solution to form amino-G acid (2-naphthylamine-6:8-disulfonic acid). This latter is fused in an autoclave with caustic soda, thus forming gamma acid.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 236
Lange, Zwischenprodukte, #2546

Dyes Derived from Gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	Aniline α-Naphthylamin	D
245	Nyanza Black B		*p*-Nitro-aniline α-Naphthylamine [*p*-Nitro-aniline reduced after coupling]	D
274	Diaminogene BB	I '14:—313,629 I '20:— 18,120	Acetyl-1:4-naphthylene-diamine-6-sulfonic Acid α-Naphthylamin	D
295	Diphenyl Fast Black	I '14:— 882	*p*:*p*'-Diamino-ditolylamine *m*-Tolylene-diamine	D
297	Benzo Fast Pink 2BL	I '14:— 3,252 I '20:— 1,226	Diamino-diphenyl-urea-disulfonic Acid Gamma Acid (2 mols)	D
327	Diamine Violet N	I '14:— 18,263 M '19:— ? M '20:— 92,503	Benzidine Gamma Acid (2 mols)	D
328	Diamine Black RO Dianol Black RW	I '14:— 8,253	Benzidine Gamma Acid (2 mols)	D
329	Diamine Brown V	M '19:— ?	Benzidine *m*-Phenylene-diamine	D
330	Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Benzidine 2:7-Naphthylene-diamine-sulfonic Acid	D
331	Alkali Dark Brown GV		Benzidine Nitroso-β-naphthol	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Benzidine Amino-R Acid	D

Dyes Derived from Gamma Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Benzidine H Acid	D
335	Naphthamine Black RE	I '14:— 49,016	Benzidine K Acid	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Benzidine Salicylic Acid	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,959 M '20:—257,872	Benzidine Salicylic Acid	D
399	Indazurine TS		Tolidin 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
402	Diamine Blue Black E		Ethoxy-benzidine 2-Naphthol-3:7-disulfonic Acid	D
403	Diamine Black BO		Ethoxy-benzidine Gamma Acid (2 mols)	D
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6- *and* 7-sulfonic Acids *m*-Phenylene-diamine *p*-Phenylene-diamine	D
437	Iso-Diphenyl Black R		Resorcinol *p*-Phenylene-diamine *m*-Phenylene-diamine	D

Dyes Derived from Gamma Acid *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES *(continued)*			
440	Direct Indigo Blue BK		Benzidine *m*-Amino-*p*-cresol Methyl Ether Gamma Acid (2 mols)	D
442	Direct Black V	I '14:—145,738	Benzidine 2R Acid *a*-Naphthylamine	D
444	Crumpsall Direct Fast Brown B		Benzidine Salicylic Acid Aniline	D
461	Coomassie Union Blacks		1:4-Naphthylene-diamine-2-sulfonic Acid *m*-Phenylene-(*or* Tolylene-) diamine *or* Resorcinol (2 mols)	D
472	Chloramine Blue HW		Benzidine 2:5-Dichloro-aniline H Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine *p*-Nitro-aniline H Acid	D
	TETRAKISAZO DYE			
491	Dianil Black PR		Benzidine sulfonic Acid Gamma Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D

G R Acid

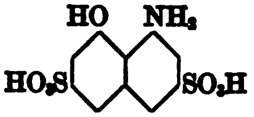
See, 1-Naphthol-3:6-disulfonic Acid

H Acid

1-Amino-8-naphthol-3: 6-disulfonic Acid

Amino-naphthol-disulfonic Acid H

8-Amino-1-naphthol-3: 6-disulfonic Acid (*C. A. nomen.*)


$= C_{10}H_9NO_7S_2 = 319$

Statistics.—Imported '14:— 96,296 lbs.
Manufactured '17:—3,089,273 lbs.
Manufactured '18:—3,837,534 lbs.
Manufactured '19:—2,883,228 lbs.
Manufactured '20:—5,180,993 lbs.

Formation.—Naphthalene is trisulfonated with oleum, and then nitrated and reduced with iron, resulting in the formation of Koch acid or 1-naphthylamine-3: 6: 8-trisulfonic acid. This latter is now fused in an autoclave with caustic soda, forming H acid

Literature.—Cain, Intermediate Products (2d Ed.), 237
Lange, Zwischenprodukte, #2720–2724
Thorpe, Dic. Chemistry, 3, 641

Dyes Derived from H Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
41	Fast Acid Fuchsine B	M '18:— ? M '19:— 26,699 M '20:— 30,678	Aniline	A
182	Fast Sulfon Violet 5BS Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	Aniline Benzene-(*or* Toluene-) sulfo chloride	A
186	Lanacyl Violet B	I '14:— 3,628 M '17:— ? M '18:— ?	Ethyl-α-naphthylamine	A

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
187	Lanacyl Blue BB	I '14:— 4,200	5-Amino-1-naphthol	A
188	Tolyl Blue SR Sulfon Acid Blue R	I '14:— 45,038 M '17:— ? M '18:— ? M '19:— ? M '20:—454,185	Phenyl-1-naphthylamine-8-sulfonic Acid	A
189	Sulfon Acid Blue B	I '14:— 35,560 M '17:— ? M '19:— ? M '20:— ?	Tolyl-1-naphthylamine-8-sulfonic Acid	A
	DISAZO DYES			
217	Naphthol Blue Black Agalma Black 10B	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 840 M '20:— 2,608,864	*p*-Nitro-aniline Aniline	A
261	Buffalo Black 10B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid α-Naphthylamine	A
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	Naphthionic Acid β-Naphthol	A
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Benzidine Gamma Acid	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
334	Diphenyl Blue Black	I '14:— 26,240	Benzidine Ethyl-gamma Acid	D
336	Benzo Cyanine R	I '14:— 201	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D
337	Diamine Blue 2B Benzo Blue 2B	I '14:— 19,035 M '17:— 1,445,059 M '18:— 1,523,985 M '19:— 1,380,335 M '20:— 1,789,774	Benzidine H Acid (2 mols)	D
353	Direct Indigo Blue BN	I '14:— 6,000	Benzidine 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
381	Azo Black Blue B, R		Tolidine *m*-Hydroxy-diphenylamine	D
382	Azo Mauve B	M '17:— ? M '20:— ?	α-Naphthylamine Tolidine	D
383	Naphthazurine B	I '14:— 4,782	Tolidine β-Naphthylamine	D
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Tolidine Nevile-Winther's Acid	D
390	Benzo Cyanine B	I '14:— 201	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
391	Diamine Blue 3B Benzo Blue 3B	I ’14:— 1,365 M ’17:— 14,533 M ’18:— 99,645 M ’19:—182,946 I ’20:— 1,124 M ’20:—136,891	Tolidine H Acid (2 mols)	D
425	Benzo Cyanine 3B	I ’14:— 1,001	Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid	D
426	Diamine Pure Blue Benzamine Pure Blue	I ’14:— 12,881 M ’17:— ? M ’18:— ? M ’19:—192,350 I ’20:— 662 M ’20:—223,100	Dianisidine H Acid (2 mols)	D
430	Indazurine 5 GM		Dianisidine 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
	Trisazo Dyes			
438	Melogene Blue BH	M ’17:— ? M ’18:— ?	Benzidine *p*-Xylidine H Acid (2 mols)	D
439	Direct Indigo Blue A	M ’18:— ?	H Acid (2 mols) Benzidine *m*-Amino-*p*-cresol Methyl Ether	D
441	Diazo Blue Black RS	M ’19:— ? M ’20:— ?	Benzidine *a*-Naphthylamine H Acid (2 mols)	D
443	Direct Indone Blue R		Benzidine *a*-Naphthylamine 2 R Acid	D
446	Benzo Olive	I ’14:— 1,149	Benzidine Salicylic Acid *a*-Naphthylamine	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
448	Diamine Bronze G	I '14:— 4,495	Benzidine Salicylic Acid *m*-Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline *m*-Tolylene-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine Aniline Phenol	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine *o*-Chloro-*p*-nitro-aniline Phenol	D
468	Diphenyl Green 3G		Benzidine *o*-Chloro-*p*-nitro-aniline Salicylic Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763	Benzidine 2: 5-Dichloro-aniline *m*-Phenylene-diamine	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine 2: 5-Dichloro-aniline Phenol	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine 2: 5-Dichloro-aniline H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine 2: 5-Dichloro-aniline Gamma Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine *p*-Nitro-aniline Gamma Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine *p*-Nitro-aniline Phenol	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 53,292	Benzidine *p*-Nitro-aniline Salicylic Acid	D

Histazarin

2: 3-Dihydroxy-anthraquinone (*not considered herein*)

***o*-Homo-salicylic Acid**

See, o-Cresotic Acid

***p*-Hydrazine-*benzene*-sulfonic Acid** (*C. A. nomen.*)

See, Phenyl-hydrazine-*p*-sulfonic Acid

***a*-Hydro-juglone**

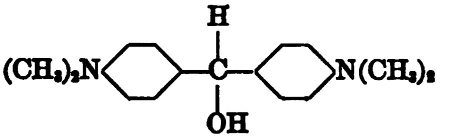
1: 4: 5-Trihydroxy-naphthalene (*not considered herein*)

Hydrol

Tetramethyl-diamino-benzohydrol

p: *p*′-Bis(dimethylamino)-*b*enzohydrol (*C. A. nomen.*)

Michler's Hydrol



$=C_{17}H_{22}N_2O=270$

Sᴛᴀᴛɪsᴛɪᴄs.—Manufactured '20:—88,583 lbs.

Fᴏʀᴍᴀᴛɪᴏɴ.—Dimethyl-aniline is condensed with formaldehyde in presence of hydrochloric acid, and the resulting product is oxidised with lead peroxide; or the corresponding ketone (tetramethyl-diamino-benzophenone) is reduced with zinc

Lɪᴛᴇʀᴀᴛᴜʀᴇ.—Cain, Intermediate Products (2d Ed.), 102–3
Lange, Zwischenprodukte, #1358

Dyes Derived from Hydrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Tʀɪᴘʜᴇɴʏʟ-ᴍᴇᴛʜᴀɴᴇ Dʏᴇs			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	*p*-Nitro-toluene [Oxidation]	B
509	Chrome Green		Benzoic Acid [Oxidation]	M
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline [Oxidation]	B
528	Fast Acid Violet 10B	I '14:— 12,919 M '17:— ? M '18:— ? M '19:— ? I '20:— 10,086 M '20:— ?	Benzyl-ethyl(methyl)-aniline-disulfonic Acid [Oxidation]	A

Dyes Derived from Hydrol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Trisazo Dyes (*continued*)			
542	Agalma Green B	I '14:— 2,294	4-Chloro-3: 5-dinitro-benzene-sulfonic Acid Metanilic Acid *or* Dinitro-diphenylamine-disulfonic Acid	A
549	Chrome Violet	I '14:— 51	Salicylic Acid [Oxidation]	M
550	Chrome Bordeaux		Amino-salicylic Acid [Oxidation]	M
	Diphenyl-naphthyl-methane Dyes			
558	Victoria Blue R	I '14:— 4,171 I '20:— 97	Ethyl-a-naphthylamine [Oxidation]	B
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,171 M '20:— ?	Phenyl-a-naphthyl-amine [Oxidation]	B
562	Fast Acid Blue B	I '14:— 33,251 I '20:— 6,478	1-Naphththylamine-2-sulfonic Acid [Oxidation]	A
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Naphthionic Acid *or* Laurent's Acid [Substitution of -NH$_2$ by -SO$_3$Na and Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Naphthalene *or* Naphthalene-2: 7-disulfonic Acid	A

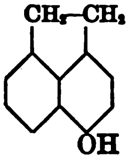
Dyes Derived from Hydrol (*continued*)

y Name and s of Dye	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
DIPHENYL-NAPHTHYL-METHANE DYES (*continued*)			
Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	G Acid	A
Chrome Blue		1-Hydroxy-2-naphthoic Acid [Oxidation]	M
OXAZINE DYE			
New Fast Blue F	I '14:— 2,502	Nitroso-dimethyl-aniline β-Naphthol *or* [Meldola's Blue]	B

3-Hydroxy-acenaphthene

4-Hydroxy-acenaphthene (*German numbering*)

3-Acenaphthenol (*C. A. nomen.*)



$= C_{12}H_{10}O = 170$

FORMATION.—From 3-amino-acenaphthene by diazotizing and then boiling to hydrolyze the diazo group

LITERATURE.—Lange, Zwischenprodukte, #2957
Frdl. **10**, 544

Dye Derived from 3-Hydroxy-acenaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
894	Alizarin Indigo B	I '14:— 402 I '20:— 291	2-Isatin Anilide	V

4-Hydroxy-acenaphthene (*German numbering*)

See, 3-Hydroxy-acenaphthene

1-Hydroxy-anthracene

See, 1-Anthrol (*C. A. nomen.*)

9-Hydroxy-anthracene

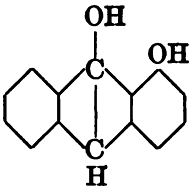
See, 9-Anthrol (*C. A. nomen.*)

1-Hydroxy-anthranol

1-Hydroxy-9-anthrol

α-Hydroxy-anthranol

1:9-Anthradiol (*C. A. nomen.*)



$= C_{14}H_{10}O_2 = 210$

FORMATION.—1-Hydroxy-anthraquinone is reduced with hydrosulfite and alkali or with stannous chloride and hydrochloric acid

LITERATURE.—Ger. Pat. 242,053; Frdl. **10**, 532
Barnett, Anthracene and Anthraquinone

Dye Derived from 1-Hydroxy-anthranol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
896	INDIGO GROUP DYES Helindone Blue 3GN	I '14:— 622 I '20:— 2,527	2-Isatin Anilide	V

α-Hydroxy-anthranol

See, 1-Hydroxy-anthranol

1-Hydroxy-9-anthrol

See, 1-Hydroxy-anthranol

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
448	Diamine Bronze G	I '14:— 4,495	Benzidine Salicylic Acid *m*-Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline *m*-Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline *m*-Tolylene-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine Aniline Phenol	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine *o*-Chloro-*p*-nitro-aniline Phenol	D
468	Diphenyl Green 3G		Benzidine *o*-Chloro-*p*-nitro-aniline Salicylic Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763	Benzidine 2: 5-Dichloro-aniline *m*-Phenylene-diamine	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine 2: 5-Dichloro-aniline Phenol	D

Dyes Derived from H Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine 2: 5-Dichloro-aniline H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine 2: 5-Dichloro-aniline Gamma Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine *p*-Nitro-aniline Gamma Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine *p*-Nitro-aniline Phenol	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 53,292	Benzidine *p*-Nitro-aniline Salicylic Acid	D

Histazarin

2: 3-Dihydroxy-anthraquinone (*not considered herein*)

***o*-Homo-salicylic Acid**

See, *o*-Cresotic Acid

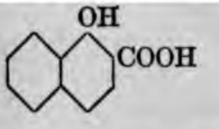
***p*-Hydrazine-*benzene*-sulfonic Acid** (*C. A. nomen.*)

See, Phenyl-hydrazine-*p*-sulfonic Acid

***a*-Hydro-juglone**

1: 4: 5-Trihydroxy-naphthalene (*not considered herein*)

1-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)
1-Hydroxy-naphthalene-2-carboxylic Acid
α-Oxy-naphthoic Acid
α-Naphthol-carboxylic Acid



$=C_{11}H_8O_3=188$

FORMATION.—α-Naphthol is converted into sodium α-naphtholate, and treated with the theoretical amount of carbon dioxide under pressure and at 120–145°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 240
Lange, Zwischenprodukte, #775, 2308

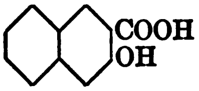
Dye Derived from 1-Hydroxy-2-naphthoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYES			
567	Chrome Blue		Hydrol [Oxidation]	M

2-Hydroxy-3-naphthoic Acid

See, 3-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

3-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)
2-Hydroxy-3-naphthoic Acid
2-Hydroxy-naphthalene-3-carboxylic Acid
β-Oxy-naphthoic Acid
β-Naphthol-carboxylic Acid



$=C_{11}H_8O_3=188$

STATISTICS.—Imports '14:—2,359 lbs.
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—β-Naphthol is converted into the sodium β-naphtholate, and treated with the theoretical amount of carbon dioxide under pressure and at 200–250°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 241
Lange, Zwischenprodukte, #775, 2308

Dyes Derived from 3-Hydroxy-2-naphthoic Acid

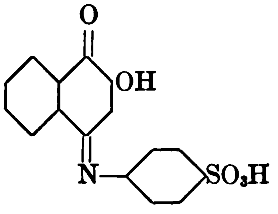
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
45	Brilliant Lake Red R	I '14:— 31,674 I '20:— 1,071	Aniline	CL
152	Lithol Rubine B Permanent Red 4B	I '14:—101,395 M '19:— ? I '20:— 2,983 M '20:— ?	p-Toluidine-o-sulfonic Acid	CL
179	Lake Bordeaux B		2-Naphthylamine-1-sulfonic Acid	CL

β-Hydroxy-naphthoquinone

1: 2-Dihydroxy-naphthalene (*not considered herein*)

β-Hydroxy-naphthoquinonyl-aniline-p-sulfonic Acid

N-(3-Hydroxy-4-keto-1(4)-naphthylidene)-sulfanilic Acid (*C. A. nomen.*)



$=C_{16}H_{11}NO_5S=329$

FORMATION.—The potassium salt of 1:2-naphthoquinone-4-sulfonic acid is condensed with the sodium salt of sulfanilic acid, splitting off a sulfonic group and furnishing the β-hydroxy-naphthoquinonyl-aniline-*p*-sulfonic acid

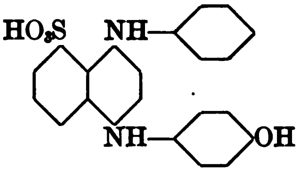
LITERATURE.—Lange, Schwefelfarbstoffe, 393,139
Lange, Zwischenprodukte, #2870, 2871
Schultz, Farbstofftabellen, #747

Dye Derived from β-Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
747	SULFUR DYE Thional Brown G	I '14:— 110 I '20:— 43,219	[S+Na_2S]	S

4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

8-Anilino-5-(*p*-hydroxy-anilino)-1-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{22}H_{18}N_2O_4S = 406$

FORMATION.—By condensation of phenyl-1-naphthylamine-8-sulfonic acid and *p*-amino-phenol

LITERATURE.—Lange, Schwefelfarbstoffe, 425

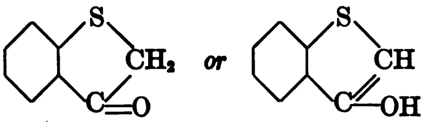
Dye Derived from 4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
746	SULFUR DYE Thional Green B Katigene Green	I '14:— 63,929 I '20:— 14,370	[Na_2S+S]	S

2-Hydroxy-*thionaphthene* (*C. A. and English nomen.*)

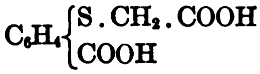
3-Hydroxy-1-thionaphthene (*German numbering*)

Thioindoxyl



$= C_8H_6OS = 150$

FORMATION.—Thiosalicylic acid with chloro-acetic acid gives phenyl thioglycolic-*o*-carboxylic acid:



$$C_6H_4\begin{cases} S.CH_2.COOH \\ COOH \end{cases}$$

This body, by heating with a little water and caustic soda, closes up the second ring and forms 2-hydroxy-thionaphthene-1-carboxylic acid, which in warm acid solution decomposes, losing CO_2 and forming 2-hydroxy-thionaphthene

LITERATURE.—Lange, Zwischenprodukte, #2148–2163
Georgievics and Grandmougin, Dye Chemistry, 432–434
Schultz, Farbstofftabellen (5 auf.), #912
Cain, Intermediate Products (2d Ed.), 159

Dyes Derived from 2-Hydroxy-thionaphthene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
899	Ciba Gray G	I '14:— 675	2-Isatin anilide [Bromination]	V
900	Ciba Violet 3B	I '14:— 2,667	2-Isatin anilide [Bromination]	V
900	Thio Indigo Violet K		2-Isatin anilide [Bromination]	V
901	Ciba Violet B	I '14:— 20,836 I '20:— 18,287	2-Isatin anilide [Bromination]	V
905	Thio Indigo Scarlet R	I '20:— 270	Isatin	V
906	Thio Indigo Scarlet G	I '20:— 1,291	Isatin [Bromination]	V
907	Ciba Scarlet G	I '14:— 22,265 I '20:— 25,578	Acenaphthenequinone	V
908	Ciba Red R	I '14:— 1,001	Acenaphthenequinone [Bromination]	V
912	Thio Indigo Red B	I '14:— 1,102 I '20:— 275	2-Hydroxy-thionaphthene (2 mols)	V
919	Ciba Bordeaux B	I '14:— 899 I '20:— 1,786	2-Hydroxy-thionaphthene (2 mols) [Bromination] *or* [Bromination of Thio Indigo Red R]	V

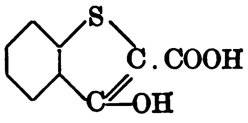
3-Hydroxy-thionaphthene

See, 2-Hydroxy-thionaphthene

2-Hydroxy-*t*hionaphthene-1-carboxylic Acid (*C. A. nomen.*)

3-Hydroxy-(1)-thionaphthene-2-carboxylic Acid (*German numbering*)

Thioindoxyl-carboxylic Acid



$= C_9H_6O_3S = 194$

FORMATION.—From phenyl-thioglycol-*o*-carboxylic acid through closing of the side chain upon fusion with caustic soda. (The carboxylic group is very easily split off with the formation of 2-hydroxy-thionaphthene.) Cf. 2-hydroxy-thionaphthene

LITERATURE.—Cain, Intermediate Products (2d Ed.), 159
Lange, Zwischenprodukte, #2148–2163

USES.—See 2-hydroxy-thionaphthene

I Acid

See, J Acid

***p*: *p*′-Imino-bisaniline** (*C. A. nomen.*)

See, p: *p*′-Diamino-diphenylamine

4: 4′-Imino-bis-*o*-toluidine (*C. A. nomen.* $NH_2 = 1$)

See, p: *p*′-Diamino-ditolyl-amine

Indanthrene

See, Indanthrone

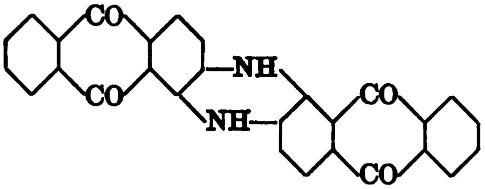
Indanthrene-sulfonic Acid

See, Indanthrone-sulfonic Acid

Indanthrone

Dianthraquinone-dihydroazine

Indanthrene (*C. A. nomen.*)



$=C_{28}H_{14}N_2O_4=442$

Formation.—Anthraquinone is sulfonated with oleum to 2-anthraquinone-sulfonic acid, which upon being heated in an autoclave with ammonia forms 2-amino-anthraquinone. This latter by the action of alkali at 200–300° is converted to indanthrone

Literature.—Georgievics and Grandmougin, Dye Chemistry, 449–450
Barnett, Anthracene and Anthraquinone, 342
Schultz, Farbstofftabellen (1914 Ed.), #837

Dyes Derived from Indanthrone

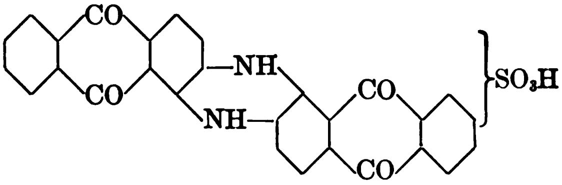
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Anthraquinone and Allied Dyes			
837	Indanthrene Blue R	I '14:— 500	[This is indanthrone]	V
838	Indanthrene Blue RS	I '14:—187,379 M '17:— ? I '20:— 16,385 M '20:— ?	[Reduction]	V
840	Indanthrene Blue	I '14:— 6,120 I '20:— 551	[Oxidation]	V
841	Indanthrene Blue 2GS	I '14:— 10,163 I '20:— 500	[?]	V
842	Indanthrene Blue GCD	I '14:—478,980 M '19:— ? I '20:—147,620	[Dichlorination]	V

Dyes Derived from Indanthrone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
843	Indanthrene Blue GC	I '14:— 1,499 I '20:— 4,700	[Dibromination]	V
850	Indanthrene Blue WB	I '14:— 32,957 I '20:— 2,998	[?]	V

Indanthrone-sulfonic Acid

Indanthrene-sulfonic Acid (*C. A. nomen.*)



$=C_{28}H_{14}N_2O_7S=522$

FORMATION.—(1) From 2-amino-anthraquinone-sulfonic acid by fusion with caustic alkali at 200–300° C. (2) By sulfonating indanthrone (obtained by alkaline fusion of 2-amino-anthraquinone)

LITERATURE.—Barnett, Anthracene and Anthraquinone, 352
Thorpe, Dic. Chemistry, **3**, 101 *et seq.*

Dye Derived from Indanthrone-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
840	Indanthrene Blue	I '14:— 6,120 I '20:— 1,702		V

Indigo[7]

Note.—Indigo is of course a dye and not an intermediate. However because of their close mutual connection, it was considered worth while to list together the dyes derived directly from indigo. All of these dyes are also classified by the various intermediates that are used for the manufacture of indigo, namely:—

1. *Phenyl-glycine (2 mols)*
2. *Phenyl-glycine-o-carboxylic Acid (2 mols)*
3. *Thiocarbanilide (2 mols)*
4. *Aniline (2 mols)*
5. *Phthalic anhydride (2 mols)*

Dyes Derived from Indigo

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:—8,507,359 M '17:—274,771 M '18:—3,083,888 M '19:—8,863,824 I '20:—520,347 M '20:—18,178,231		V
876	Indigo MLB Indigo White		[Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:—1,876,787 M '18:—1,434,703 M '19:—1,699,670 I '20:— 5,512 M '20:—1,395,000	[Sulfonation]	A
878	Indigotine P		[Sulfonation]	A

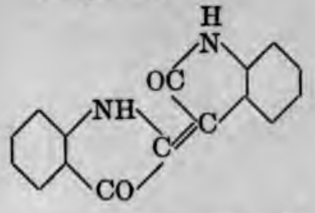
Dyes Derived from Indigo *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES *(continued)*			
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	[Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	[Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	[Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	[Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	[Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	[Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	[Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	[Chlorination, Bromination]	V
889	Indigo Yellow 3G		Benzoyl Chloride	V
890	Ciba Yellow G	I '14:— 48	Benzoyl Chloride [Bromination]	V

Indigo Red

See, Indirubin

I rubin (*C. A. nomen.*)
Oxindole-[$\Delta^{3,2'}$]-pseudoindoxyl
Indigo Red



$=C_{16}H_{10}N_2O_2=262$

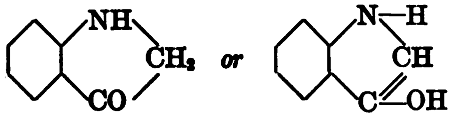
FORMATION.—By reaction of indoxyl on isatin in the " indoxyl melt "

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 410
Ger. Pat. 192,682; Frdl. 9, 533

Dye Derived from Indirubin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
897	Ciba Heliotrope B		[Bromination]	V

Indoxyl (*C. A. nomen.*)
3-Hydroxy-indole



$=C_8H_7NO=133$

FORMATION.—From phenyl-glycine by fusion with sodamide

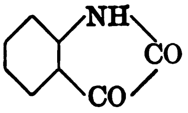
LITERATURE.—Lange, Zwischenprodukte, #2057–2084

Dye Derived from Indoxyl

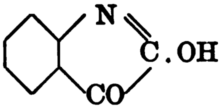
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
897	Ciba Heliotrope B		Isatin [Bromination]	V

Isatin (*C. A. nomen.*)

2-Hydroxy-3-pseudoindolone



or



$=C_8H_5NO_2=147$

Statistics.—Imported '14:—very small
Manufactured '20:— ?

Formation.—From indoxyl by oxidation

Literature.—Lange, Zwischenprodukte, #1815, 2023, 2110–2116

Dyes Derived from Isatin

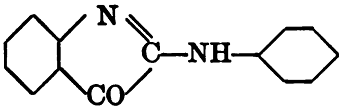
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Indigo Group Dyes			
897	Ciba Heliotrope B		Indoxyl [Bromination]	V
898	Helindone Violet D		7-Methyl-indoxyl [Bromination]	V
904	Helindone Brown G	I '14:— 13,086 I '20:— 2,200	5-Amino-2-hydroxy-thionaphthene [Bromination]	V
905	Thio Indigo Scarlet R	I '20:— 370	2-Hydroxy-thionaphthene	V
906	Thio Indigo Scarlet G	I '20:— 1,291	2-Hydroxy-thionaphthene [Bromination]	V

2-Isatin Anilide

α-Isatin Anilide

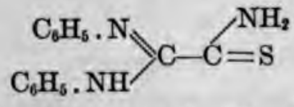
Isatin-2-phenylimide

2-Anilino-3-pseudoindolone (*C. A. nomen.*)



$=C_{14}H_{10}N_2O=222$

FORMATION.—Aniline is condensed with carbon disulfide to thiocarbanilide $(C_6H_5 . NH)_2 CS$, which is treated in solution with potassium cyanide and lead carbonate, resulting in the formation of the corresponding cyanide. This cyanide is reacted with yellow ammonium sulfide (containing $NH_4 . S . S . NH_4$), and a thioamide is formed:



This compound upon being heated with sulfuric acid gives a good yield of 2-isatin anilide

LITERATURE.—Lange, Zwischenprodukte, #2132–2134
Georgievics and Grandmougin, Dye Chemistry, 413

Dyes Derived from 2-Isatin Anilide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
894	Alizarin Indigo B	I '14:— 402 I '20:— 291	3-Hydroxy-acenaphthene	V
896	Helindone Blue 3GN	I '14:— 622 I '20:— 2,527	1-Hydroxy-anthranol	V
899	Ciba Gray G	I '14:— 675	2-Hydroxy-thionaphthene [Bromination]	V
900	Ciba Violet 3B	I '14:— 2,667	2-Hydroxy-thionaphthene [Bromination]	V
900	Thioindigo Violet K		2-Hydroxy-thionaphthene [Bromination]	V
901	Ciba Violet B	I '14:— 20,836 I '20:— 18,287	2-Hydroxy-thionaphthene [Bromination]	V

Dyes Derived from 2-Isatin Anilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
902	Helindone Brown 2R	I '14:— 876 I '20:— 1,778	5-Amino-1-hydroxy-thionaphthene [Bromination]	V
903	Helindone Brown 5R		5-Amino-1-hydroxy-thionaphthene [Bromination]	V

α-Isatin Anilide

See, 2-Isatin Anilide

Isatin-2-phenylimide

See, 2-Isatin Anilide

Isoanthraflavic Acid

2: 7-Dihydroxy-anthraquinone (*not considered herein*)

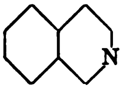
Iso-γ Acid

See, J Acid

Iso-naphthazarin

2: 3-Dihydroxy-1: 4-naphthoquinone (*not considered herein*)

Isoquinoline



$= C_9H_7N = 129$

STATISTICS.—Imported '14:—very small

FORMATION.—Isoquinoline is extracted from coal-tar or prepared by synthetical means

LITERATURE.—Lange, Zwischenprodukte, #1997

Dye Derived from Isoquinoline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
610	QUINOLINE DYE Quinoline Red		Benzo-trichloride Quinaldine	B

J Acid

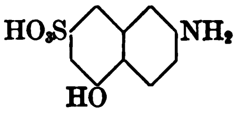
2-Amino-5-naphthol-7-sulfonic Acid

Amino-naphthol-sulfonic Acid J

6-Amino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)

I Acid

Iso-γ Acid



$= C_{10}N_9NO_4S = 239$

STATISTICS.—Imports '14:—1,153 lbs.
Manufactured '20:— ?

FORMATION.—β-Naphthylamine is disulfonated to a mixture of 2-naphthylamine-5:7-disulfonic acid and 2-naphthylamine-6:8-disulfonic acid. The latter is amino-G acid and is a step in the preparation of gamma acid. The former is fused with caustic soda in an autoclave to form J acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 235
Lange, Zwischenprodukte, #2542
Thorpe, Dic. Chemistry, **3**, 640

Dyes Derived from J Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid (2 mols) Phosgene Aniline *or* Toluidine *or* Xylidine *or* β-Naphthylamine *or* Amino-azo-benzene (2 mols)	D
326	Oxamine Violet Oxy Diamine Violet BF	I '14:— 23,981 I '20:— 732	Benzidine J Acid (2 mols)	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	Benzidine Salicylic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	Tolidine Nevile-Winther's Acid	D

Juglone

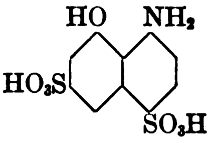
5-Hydroxy-1:4-naphthoquinone (*not considered herein*)

K Acid[1]

1-Amino-8-naphthol-4:6-disulfonic Acid

Amino-naphthol-disulfonic Acid K

8-Amino-1-naphthol-3:5-disulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_7S_2=319$

---

[1] K acid is also occasionally used as trivial name for 1:[illegible]-Dihydroxy-naphthalene-3:5-disulfonic acid.

FORMATION.—Naphthalene is disulfonated to the 1:5 acid, and the further sulfonated to the 1:3:5-trisulfonic acid. This trisulfoni acid while still in the sulfonation mixture is diluted with a little ice and cooled, and it is then nitrated cold with the theoretical amoun of mixed acid. It is reduced with iron, forming 1-naphthylamine-4:6:8-trisulfonic acid, which upon being fused with caustic sod in an autoclave yields the K acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 239
Lange, Zwischenprodukte, #2728
Thorpe, Dic. Chemistry, **3**, 642

Dyes Derived from K Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
43	Tolane Red B, G		Aniline	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	Aniline *p*-Nitro-aniline	A
219	Chrome Patent Green N		Aniline Picramic Acid	ACr
335	Naphthamine Black RE	I '14:— 49,016	Benzidine Gamma Acid	D
338	Naphthamine Blue 2B *or* 3B	I '14:— 11,707 I '20:— 400	Benzidine *or* Tolidine K Acid (2 mols)	D

Kalle's Acid

1-Naphthylamine-2:7-disulfonic Acid (*not considered herein*)

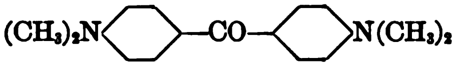
Ketone

Tetramethyl-diamino-benzophenone

p: *p*′-Bis(dimethylamino)-benzophenone (*C. A. nomen.*)

Michler's Ketone

Ketone Base


$= C_{17}H_{20}N_2O = 268$

STATISTICS.—Imported '14:—small amount
Manufactured '17:— ?
Manufactured '18:— 73,208 lbs.
Manufactured '19:—281,057 lbs.
Manufactured '20:— 90,664 lbs.

FORMATION.—From dimethyl-aniline by reaction with phosgene

LITERATURE.—Cain, Intermediate Products (2d Ed.), 103
Lange, Zwischenprodukte, #1382

Dyes Derived from Ketone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINES			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	[Ammonium chloride and Zinc chloride]	B
	TRIPHENYL-METHANE DYES			
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline	B
522	Victoria Blue 4R	I '14:— 9,599 I '20:— 152	Methyl-phenyl-α-naphthylamine	B

Dyes Derived from Ketone (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
527	Acid Violet 4BN	I '14:— 29,184 I '20:— 23,335	Benzyl-methyl-aniline	A
548	Acid Violet 6BN	I '14:— 6,861 I '20:— 5,582	3-Ethoxy-4′-methyl-diphenylamine [Sulfonation]	A
	DIPHENYL-NAPTHYL-METHANE DYES			
558	Victoria Blue R	I '14:— 4,171 I '20:— 97	Ethyl-α-naphthylamine	B
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 11,782 M '20:— ?	Phenyl-α-napthyl-amine	B
561	Acid Violet 5BNS	I '14:— 1,896	Methyl-(Ethyl-) phenyl-β-naphthylamine	A
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	β-Naphthol [Sulfonation]	A
	ACRIDINE DYE			
607	Rheonine	I '14:— 19,704	*m*-Phenylene-diamine	B

5-Keto-1-(*p*-sulfo-phenyl)-3-Δ^2-y*p*razoline-carboxylic Acid (*C. A. nomen.*)

See, 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Koch's Acid

See, 1-Naphthylamine-3: 6: 8-trisulfonic Acid

L Acid

See, 1-Naphthol-5-sulfonic Acid (*C. A. nomen.*)
See Laurent's Acid
2: 6-Dihydroxy-naphthalene-3-carboxylic Acid (*not considered herein*)

Lambda Acid *or* **λ Acid**

See, 1-Naphthylamine-2-sulfonic Acid

Landschoff and Meyer's Acid

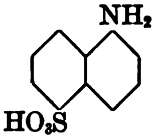
1-Naphthylamine-2: 5-disulfonic Acid (*not considered here*)

Laurent's *a* Acid

1-Nitro-naphthalene-5-sulfonic Acid (*not considered herein*)

Laurent's Acid

1-Naphthylamine-5-sulfonic Acid
a-Naphthylamine-sulfonic Acid L
5-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
Naphthalidine-sulfonic Acid
Naphthalidinic Acid
Cleve's *a* Acid
L Acid
Laurent's Naphthalidinic Acid



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Imported '14:— 2,832
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:—294,352

FORMATION.—(1) From *a*-naphthylamine by sulfonation with oleum. (2) From *a*-naphthalene-sulfonic acid by nitration reduction and separation from the 1-naphthylamine-8-sulfonic acid also formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 190
Lange, Zwischenprodukte, #2360–2
Thorpe, Dic. Chemistry, **3**, 590

Dyes Derived from Laurent's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
53	Archil Substitute 3VN		*p*-Nitro-aniline	A
162	Brilliant Fast Red G		β-Naphthol	A
	DISAZO DYES			
265	Sulfoncyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	α-Naphthylamine *or* 1-Naphthylamine-6- *and* 7-sulfonic Acids Phenyl-1-naphthylamine-8-sulfonic Acid	A
308	Diazo Black B	I '14:— 62,854	Laurent's Acid (2 mols) Benzidine	D
364	Benzopurpurin 6B	I '14:— 9,171 I '20:— 4,743	Laurent's Acid (2 mols) Tolidine	D
	TRISAZO DYE			
480	Congo Brown R	I '14:— 3,045	Benzidine Resorcinol Salicylic Acid	D
	DIPHENYL NAPHTHYLMETHANE DYE			
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Hydrol [Substitution of NH_2 by SO_3H; Oxidation]	A

Laurent's Naphthalidinic Acid

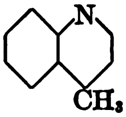
See, Laurent's Acid (1-Naphthylamine-5-sulfonic Acid)

Lepidine (*C. A. nomen.*)

4-Methyl-quinoline (*N* = *1*)

γ-Methyl-quinoline

Cincholepidine



$= C_{10}H_9N = 143$

FORMATION.—(1) From cinchonine by distillation with caustic potash. (2) By saturating a mixture of methylal [$CH_2(OCH_3)_2$] and acetone with gaseous hydrochloric acid, and then heating this with aniline and concentrated hydrochloric acid

LITERATURE.—Thorpe, Dic. Chemistry, 4, 478

Dye Derived from Lepidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
611	QUINOLINE DYE Quinoline Blue		Quinoline [Amyl-iodide]	Photography

***p*-Leucaniline**

See, Triamino-triphenyl-methane

Leuco-*iso*-naphthazarin

1:2:3:4-Tetrahydroxy-naphthalene (*not considered herein*)

Leuco-naphthazarin

1:2:5:8-Tetrahydroxy-naphthalene (*not considered herein*)

Leucotrope

Benzyl-dimethyl-phenyl-ammonium Chloride (*not considered herein*)

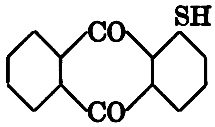
Liebman and Studer's Acid

1-Naphthol-7-sulfonic Acid (*not considered herein*)

M Acid

See, 1-Amino-5-naphthol-7-sulfonic Acid

1-(*or* 2-)Mercapto-anthraquinone



$=C_{14}H_8O_2S=240$

FORMATION.—By forming mercapto-benzoyl-benzoic acid and then closing the ring

LITERATURE.—Barnett, Anthracene and Anthraquinone, 183, 184
Lange, Zwischenproduckte, #3143–3147, 3527

Dye Derived from 1-(*or* 2-)Mercapto-anthraquinone

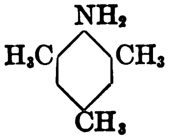
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
869	Algol Brown B	I '14:— 1,596 I '20:— 4,727		V

***o*-Mercapto-benzoic Acid** (*C. A. nomen.*)

See, Thio-salicylic Acid

Mesidine (*C. A. nomen.*)

2:4:6-Trimethyl-aniline



$=C_9H_{13}N=135$

FORMATION.—By the nuclear methylation of aniline, whereby aniline hydrochloride is heated with methanol (methyl alcohol), under pressure at 300–350°. There is formed, in addition to mesidine, *p*- and *o*-toluidine, *m*-xylidine, etc.

LITERATURE.—Ullmann, Enzy. tech. Chemie, **8**, 30

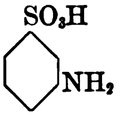
Dye Derived from Mesidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYE			
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Mesidine (2 mols) Resorcinol (2 mols) Phthalic Anhydride [PCl_5; Sulfonation] *or* [Dichloro-fluoresceine; Mesidine (2 mols); Sulfonation]	A

Meta = *m*

Note.—This is not considered in the alphabetical arrangement, e.g. meta-Phenylene-diamine is indexed as m-Phenylene-diamine under "P." However m-Phenylene-diamine precedes p-Phenylene-diamine

Metanilic Acid (*C. A. nomen.*)
m-Amino-benzene-sulfonic Acid
m-Sulfanilic Acid



$= C_6H_7NO_3S = 173$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—249,922 lbs.
Manufactured '19:—453,137 lbs.
Manufactured '20:—499,304 lbs.

FORMATION.—By sulfonating nitro-benzene with oleum, and reduction with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 47
Lange, Zwischenprodukte, #619, 620

Dyes Derived from Metanilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
134	**Metanil Yellow**	**I '14:—284,606 M '17:— ? M '18:— ? M '19:—477,143 I '20:— 8,456 M '20:—629,437**	**Diphenylamine**	**A**
135	**Metanil Yellow Brominated**		**Diphenylamine [Bromination]**	**A**
136	**Acid Yellow MGS, GG**		**Diphenylamine [Sulfonation]**	**A**
	DISAZO DYES			
210	**Cotton Orange R**	**I '14:— 16,459 I '20:— 51**	**Primuline-sulfonic Acid *m*-Phenylene-diamine-disulfonic Acid**	**D**
256	Sulfon Black 3B		α-Naphthylamine Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M '17: ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	α-Naphthylamine *or* 1-Naphthylamine-6- *and* 7-sulfonic Acids Phenyl- *or* Tolyl-1-naphthylamine-8-sulfonic Acid	A
258	Naphthalene Acid Black 4B	I '14:— 7,994	1-Naphthylamine-6- *and* 7-sulfonic Acids α-Naphthylamine	A
	TRIPHENYL-METHANE DYE			
542	Agalma Green B	I '14:— 2,294	4-Chloro-3:5-dinitro-benzene-sulfonic Acid Hydrol	A

Dyes Derived from Metanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
738	SULFUR DYE Cotton Black		1-Chloro-2: 4-dinitrobenzene [$S+Na_2S$]	S

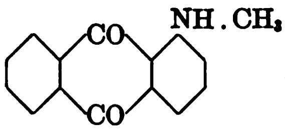
Methoxy-dimethylamino-benzophenone

See, 4-Dimethylamino-3-methoxy-benzophenone (*C. A. nomen.*)

6-Methoxy-*m*-toluidine (*C. A. nomen.* $NH_2=1$)

See, 2-Amino-*p*-cresol Methyl Ether

1-Methylamino-anthraquinone



$=C_{15}H_{11}NO_2=237$

FORMATION.—1-Chloro-anthraquinone is reacted with *p*-toluene-sulfon-methyl-amide ($CH_3 . C_6H_4 . SO_2 . NH . CH_3$), splitting off HCl and forming 1-(*p*-toluene-sulfon-methyl-amino)-anthraquinone. This latter readily decomposes in presence of sulfuric acid, forming 1-methylamino-anthraquinone

LITERATURE.—Lange, Zwischenprodukte, #3113, 3115, 3117, 3118, 3476
Barnett, Anthracene and Anthraquinone, 197, etc.

Dye Derived from 1-Methylamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
866	ANTHRAQUINONE AND ALLIED DYE Leucol Dark Green B	I '20:— 120		V

2-Methylamino-8-naphthol-6-sulfonic Acid

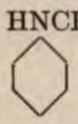
See, Methyl-gamma Acid

7-Methylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

See, Methyl-gamma Acid

***N*-Methyl-aniline**

Methyl-aniline



$=C_7H_9N=107$

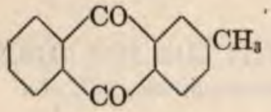
Formation.—By heating aniline and methanol (methyl alcohol) in the presence of sulfuric acid in an autoclave; or by heating aniline hydrochloride and methanol in an autoclave

Literature.—Cain, Intermediate Products (2d Ed.), 61
Lange, Zwischenprodukte, #92

Uses.—For preparation of ethyl-methyl-aniline and for benzyl-methyl-aniline

2-Methyl-anthraquinone (*C. A. nomen.*)

β-Methyl-anthraquinone



$=C_{15}H_{10}O_2=222$

Formation.—Phthalic anhydride is dissolved in toluene, and heated with $AlCl_3$ whereby *p*-toluyl-*o*-benzoic acid is formed, which latter, upon being dissolved in oleum and heated, forms the 2-methyl-anthraquinone

Literature.—Cain, Intermediate Products (2d Ed.), 259
Heller and Schülke, Ber. **41**, 3632 (1908)
Cf. Elbs, J. pr. Chem. [II] **33**, 318 (1886)
Cf. Limpricht and Wiegand, Ann. **311**, 178 (1900)

Dyes Derived from 2-Methyl-anthraquinone

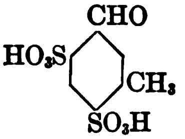
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
759	Anthraflavone G	I '14:— 7,143 I '20:— 2,354	2-Methyl-anthraquinone (2 mols)	V
792	Cibanone Orange R	I '20:— 6,125	[Sulfur]	V
795	Cibanone Yellow R	I '14:— 298 I '20:— 14,032	[Sulfur]	V

β-Methyl-anthraquinone

See, 2-Methyl-anthraquinone

3-Methyl-benzaldehyde-4: 6-disulfonic Acid

4-Formyl-6-methyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)



$=C_8H_8O_7S_2=280$

FORMATION.—Probably by oleum sulfonation of *m*-tolualdehyde (*m*-tolualdehyde can be made by oxidation of *m*-xylene)

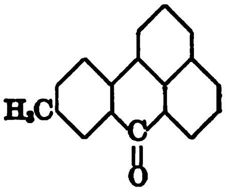
LITERATURE.—Thorpe, Dic Chemistry, 5, 516
Cf. Lange, Zwischenprodukte, #784

Dyes Derived from 3-Methyl-benzaldehyde-4: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
507	Xylene Blue VS	I '14:— 2,130 I '20:— 27,254	Diethyl-aniline (2 mols) [Oxidation]	A
508	Xylene Blue AS	I '14:— 8,238 I '20:— 5,573	Benzyl-ethyl-aniline (2 mols) [Oxidation]	A

Methyl-benzanthrone

9-Methyl-7-*meso*-benzanthrenone (*C. A. nomen.*)



$=C_{18}H_{12}O=244$

FORMATION.—By condensation of 2-methyl-anthrone with glycerol and sulfuric acid at about 120° C.

LITERATURE.—Barnett, Anthracene and Anthraquinone, 324
Fr. Pat. 407,593
Cf. Ger. Pat. 209,351. Frdl. 9, 836

Dyes Derived from Methyl-benzanthrone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
793	Cibanone Blue 3G		[Sulfur]	V
794	Cibanone Black B	I '14:— 2,802	[Sulfur]	V

1-Methyl-2:4-diamino-benzene-5-sulfonic Acid

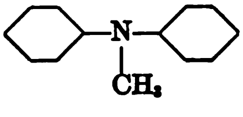
See, 4:6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

1-Methyl-2:6-diamino-benzene-4-sulfonic Acid

See, 3:5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

***N*-Methyl-diphenylamine** (*C. A. nomen.*)

Diphenyl-methyl-amine



$=C_{13}H_{13}N=183$

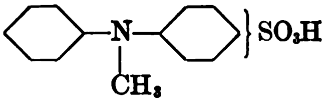
FORMATION.—From diphenylamine by heating with hydrochloric acid and methanol (methyl alcohol) in an autoclave at 250°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 73

Dyes Derived from *N*-Methyl-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
532	Alkali Violet 6B	I '14:— 3,020	Tetraethyl-diamino-benzophenone [Sulfonation]	A
534	Acid Violet 7B	I '14:— 21,665 I '20:— 51	Diethyl-*p*-amino-benzoyl Chloride *N*-Methyl-diphenylamine (2 mols)	A
547	Ketone Blue 4BN		Methoxy-dimethyl-amino-benzophenone [Sulfonation]	A

N-Methyl-diphenylamine-sulfonic Acid



$= C_{13}H_{13}NO_3S = 263$

FORMATION.—By sulfonation of methyl-diphenylamine

LITERATURE.—Beilstein, Organische Chemie (3 auf.), II spl., 324

Dye Derived from *N*-Methyl-diphenylamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
533	Acid Violet 7BN		*p*-Dimethylamino-benzoyl chloride *N*-Methyl-diphenylamine-sulfonic Acid (2 mols)	A

***p*:*p*′-Methylene-bisaniline** (*C. A. nomen.*)

See, *p*: *p*′-Diamino-diphenyl-methane

***p*:*p*′-Methylene-bis(*N*: *N*-diethyl-aniline)** (*C. A. nomen.*)

See, *p*: *p*′-Tetraethyl-diamino-diphenyl-methane

***p*:*p*′-Methylene-bis(*N*: *N*-dimethyl-aniline)** (*C. A. nomen.*)

See, *p*: *p*′-Tetramethyl-diamino-diphenyl-methane

4: 4′-Methylene-bis(*N*-methyl-*o*-*t*oluidine) (*C. A. nomen.*)

See, 4: 4′-Dimethyl-diamino-3: 3′-ditolyl-methane

4: 4′-Methylene-bis-*o*-*t*oluidine (*C. A. nomen.*)

See, *p*: *p*′-Diamino-ditolyl-methane

Methylene-bisxylidine (*C. A. nomen.*)

See, Diamino-dixylyl-methane

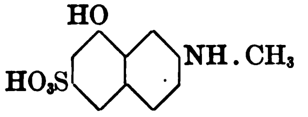
Methyl-ethyl-aniline

See, Ethyl-methyl-aniline

Methyl-gamma Acid

2-Methylamino-8-naphthol-6-sulfonic Acid

7-Methylamino-1-*n*aphthol-3-sulfonic Acid (*C. A. nomen.*)



$= C_{11}H_{11}NO_4S = 253$

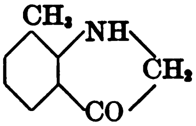
FORMATION.—G salt (Sodium salt of 2-naphthol-6: 8-disulfonic acid) is heated in an autoclave with methylamine; and the resulting 2-methylamino-naphthalene-6: 8-disulfonic acid is fused with caustic soda in an autoclave, forming methyl-gamma acid. (See Gamma acid)

LITERATURE.—Lange, Zwischenprodukte, #2550

Dye Derived from Methyl-gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
347	DISAZO DYE Diphenyl Brown RN		Benzidine Salicylic Acid	D

7-Methyl-indoxyl



$=C_9H_9NO=147$

FORMATION.—*o*-Toluidine is reacted with chloro-acetic acid, forming *o*-tolyl-glycine. This body upon fusion with sodamide will in all probability form 7-methyl-indoxy. (There is no direct reference in the literature to 7-methyl-indoxyl)

LITERATURE.—Lange, Zwischenprodukte, #241

Dye Derived from 7-Methyl-indoxyl

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
898	INDIGO GROUP DYE Helindone Violet D		Isatin [Bromination]	V

9-Methyl-7-*meso*-benzanthrenone (*C. A. nomen.*)

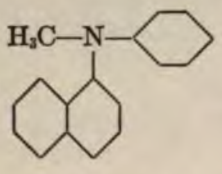
See, Methyl-benzanthrone

***N*-Methyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, p-Nitroso-methyl-aniline

Methyl-phenyl-α-naphthylamine

N-Methyl-*N*-phenyl-1-naphthylamine (*C. A. nomen.*)



$=C_{17}H_{15}N=233$

FORMATION.—Phenyl-α-naphthylamine is methylated by heating with methanol (methyl alcohol) and hydrochloric acid under pressure

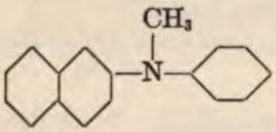
LITERATURE.—Schultz, Chemie des Steinkohlentheers (3 aufl. 1900) **1**, 117

Dye Derived from Methyl-phenyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
522	Victoria Blue 4R	I '14:— 9,599 I '20:— 152	Ketone	B

Methyl-(Ethyl-)phenyl-β-naphthylamine

N-Methyl-(Ethyl-)*N*-phenyl-2-naphthylamine (*C. A. nomen.*)



$=C_{17}H_{15}N=233$

FORMATION.—Phenyl-β-naphthylamine is methylated by heating in an autoclave with methanol (methyl alcohol) and hydrochloric acid

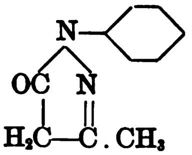
LITERATURE.—Lange, Zwischenprodukte, #2897

Dye Derived from Methyl-(Ethyl-) phenyl-β-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
561	Acid Violet 5BNS	I '14:— 1,896	Ketone [Sulfonation]	A

3-Methyl-1-phenyl-5-*pyrazolone* (*C. A. nomen.*)

1-Phenyl-3-methyl-5-pyrazolone



$= C_{10}H_{10}N_2O = 174$

STATISTICS.—Imported '14:—449 lbs.

FORMATION.—By heating the reaction product of phenyl-hydrazine and aceto-acetic ethyl ester

LITERATURE.—Lange, Zwischenprodukte. #138

Dyes Derived from 3-Methyl-1-phenyl-5-pyrazolone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
21	Pigment Chrome Yellow L		Toluidine	CL
24	Pigment Fast Yellow R		*o*-Toluidine-*m*-sulfonic Acid	CL
26	Dianil Yellow R		Primuline-sulfonic Acid	D
28	Pigment Fast Yellow G	M '19:— ? I '20:— 170	*p*-Sulfo-anthranilic Acid	CL
29	Eriochrome Red B	I '14:— 5,491	1-Amino-2-naphthol-4-sulfonic Acid	CL

2-Methyl-quinoline

See, Quinaldine (*C. A. nomen.*)

4-Methyl-quinoline (*N* = *1*)

See, Lepidine (*C. A. nomen.*)

α-Methyl-quinoline

See, Quinaldine (*C. A. nomen.*)

γ-Methyl-quinoline

See, Lepidine (*C. A. nomen.*)

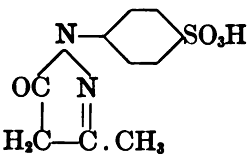
Methyl Resorcinol

See, Resorcinol Methyl Ether

3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

1-(*p*-Sulfophenyl)-3-methyl-5-pyrazolone

p-(4: 5-Dihydro-5-keto-3-methyl-1-pyrazolyl)-*b*enzene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_4S = 254$

Formation.—(1) By sulfonating 3-methyl-1-phenyl-5-pyrazolone by heating with 4 parts of 30 per cent oleum. (2) By heating phenylhydrazine-*p*-sulfonic acid with aceto-acetic ethyl ester in 50 per cent acetic acid solution for few hours

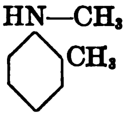
Literature.—Cain, Intermediate Products (2d Ed.), 169
Lange, Zwischenprodukte, #138

Dyes Derived from 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	Aniline	A
27	Dianil Yellow 2R		Primuline-sulfonic Acid	D

N-Methyl-o-toluidine (*C. A. nomen. NHR = 1*)

Methyl-*o*-toluidine



$=C_8H_{11}N=121$

STATISTICS.—Manufactured '19:— ?

FORMATION.—(1) By heating *o*-toluidine, methanol (methyl alcohol) and hydrochloric acid in an autoclave. (2) By condensing *o*-toluidine and formaldehyde, and reducing to methyl-*o*-toluidine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 60, 70
Cf. Lange, Zwischenprodukte, #128

Dyes Derived from *N*-Methyl-*o*-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINE DYE			
494	Auramine G	I '14:— 1,902	Methyl-*o*-toluidine (2 mols) [Formaldehyde, sulfur, ammonium chloride, etc.]	B
	TRIPHENYL-METHANE DYE			
501	Glacier Blue Brilliant Glacier Blue	I '14:— 2,495	Methyl-*o*-toluidine (2 mols) 2:5-Dichloro-benzaldehyde [Oxidation]	B
	AZINE DYE			
684	Brilliant Rhoduline Red		N^3-Ethyl-4-*m*-tolylene-diamine Aniline	B

Michler's Hydrol
See, Hydrol

Michler's Ketone *or* **Base**
See, Ketone

Monochloro-benzene[1]
See, Chloro-benzene

Monoethyl-aniline[1]
See, Ethyl-aniline

Monomethyl-aniline[1]
See, Methyl-aniline

Mononitro-chloro-benzene[1]
See, Chloro-nitro-benzene

Monosulfonic Acid F
See, 2-Naphthol-7-sulfonic Acid

Monosulfo Acid H
1-Amino-8-naphthol-3-sulfonic Acid (*not considered herein*)

Mu Acid
See, 1-Naphthylamine-6-sulfonic Acid

Myrbane Oil
See, Nitro-benzene

Naphtha-
See also, Naphtho-

α-Naphthahydroquinone
1:4-Dihydroxy-naphthalene (*not considered herein*)

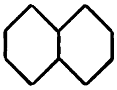
β-Naphthahydroquinone
1:2-Dihydroxy-naphthalene (*not considered herein*)

[1] "Mono" is superfluous and is consequently not recommended.

Naphthalene (*C. A. nomen.*)

Naphthalin

Note.—Naphthalene is a crude and not an intermediate as a rule



$=C_{10}H_8=128$

STATISTICS.—

	Refined Naphthalene	
	Manufactured	*Imported*
Calendar Year 1917:—	35,342,911 lbs.	267,057 lbs.
" " 1918:—	33,701,779 lbs.	2,795 lbs.
" " 1919:—	17,625,235 lbs.	7,650 lbs.
" " 1920:—	30,230,734 lbs.	3,697,562 lbs.

FORMATION.—From coal tar by extraction and purification

LITERATURE.—Thorpe, Dic. Chemistry, **3**, 560

Dyes Derived from Naphthalene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Hydrol	A
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G		Phthalic anhydride	CL

1: 5-Naphthalenediol (*C. A. nomen.*)

See, 1: 5-Dihydroxy-naphthalene

2: 7-Naphthalenediol (*C. A. nomen.*)

See, 2: 7-Dihydroxy-naphthalene

Naphthalene-1: 5- *and* 1: 6-disulfonic Acids

The 1: 5 acid is also called:

Armstrong's Acid

Armstrong's δ Acid

Naphthalene-γ-disulfonic Acid of Armstrong and Wynne

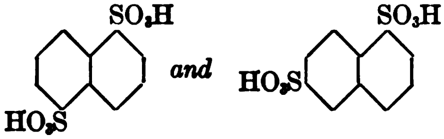
Naphthalene-δ-disulfonic Acid of Beilstein and Schultz

The 1: 6-acid is also called:

Ewer and Pick's Acid

Naphthalene-? : β-disulfonic Acid of Armstrong and Wynne

Naphthalene-γ-disulfonic Acid of Beilstein and Schultz



$=C_{10}H_8O_6S_2=288$

Formation.—The above acids are prepared by sulfonation of naphthalene with five parts of 23 per cent oleum at 60°; or with five parts of ordinary sulfuric acid (66°) using first one part at 180° to form the β-sulfonic acid and then four parts at 95-100° for 20-24 hours

If the 1: 5-acid alone is wanted the conditions of sulfonation are varied slightly, generally starting with the α-sulfonic acid. The separation is effected by crystallizing out the 1: 5 acid or its sodium salt from the diluted sulfonation product

Literature.—Cain, Intermediate Products (2d Ed.), 176, 177
Thorpe, Dic. Chemistry, **3**, 575

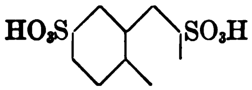
Uses.—The mixed acids are used for the preparation of 1-naphthylamine-3: 8- *and* 4: 8-disulfonic acids, and the separation then made

The 1: 5-acid is used for making naphthalene-1: 3: 5-trisulfonic acid

Naphthalene-2: 7-disulfonic Acid

α-Naphthalene-disulfonic Acid (of Ebert and Merz)

Ebert and Merz α Acid



$=C_{10}H_8O_6S_2=288$

Statistics.—Manufactured 1918, 1919, 1920 in undisclosed quantities

Formation.—Sodium 2-naphthalene-sulfonate is further sulfonated by dissolving in about two parts of monohydrate or a larger amount of 66° sulfuric acid, and heating to 180° for 6-8 hours. There is formed principally naphthalene-2:6- and 2:7-sulfonic acids, and the separation is effected through the calcium salts, the 2:6 salt being less soluble

Literature.—Lange, Zwischenprodukte, #2442
Ger. Pat. 61,730
Thorpe, Dic. Chemistry, 3, 577

Dyes Derived from Naphthalene-2:7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Hydrol [Oxidation]	A

Naphthalene-?: β-disulfonic Acid of Armstrong and Wynne

See, Naphthalene-1:6-disulfonic Acid

Naphthalene-γ-disulfonic Acid of Armstrong and Wynne

See, Naphthalene-1:5-disulfonic Acid

Naphthalene-δ-disulfonic Acid of Beilstein and Schultz

See, Naphthalene-1:5-disulfonic Acid

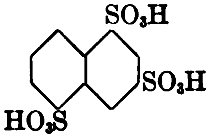
Naphthalene-γ-disulfonic Acid of Beilstein and Schultz

See, Naphthalene-1:6-disulfonic Acid

α-Naphthalene-disulfonic Acid of Ebert and Merz

See, Naphthalene-2:7-disulfonic Acid

Naphthalene-1:3:5-trisulfonic Acid



$= C_{10}H_8O_9S_3 = 368$

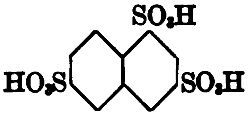
Formation.—By sulfonation of naphthalene-1: 5-disulfonic acid

Literature.—Cain, Intermediate Products (2d Ed.), 179
Thorpe, Dic. Chemistry, 3, 578

Uses.—For preparation of 1-naphthylamine-4: 6: 8-trisulfonic acid

Naphthalene-1: 3: 6-trisulfonic Acid

Trisulfonic Acid



$=C_{10}H_8O_9S_3=368$

Formation.—By sulfonating naphthalene for some hours at 180° with 24 per cent oleum, or preferably by sulfonating sodium naphthalene-β-sulfonate at a low temperature with forty per cent oleum

Literature.—Cain, Intermediate Products (2d Ed.), 181
Lange, Zwischenprodukte, #2662
Thorpe, Dic. Chemistry, 3, 578

Uses.—For preparation of 1-naphthol-3:6-disulfonic acid and 1-naphthylamine-3: 6: 8-trisulfonic acid. The latter acid is the last step prior to the manufacture of H acid (1-amino-8-naphthol-3: 6-disulfonic Acid)

Naphthalic Acid

Naphthalene-1: 8-dicarboxylic Acid (*not considered herein*)

Naphthalidam

See, α-Naphthylamine

Naphthalidine

See, α-Naphthylamine

Naphthalidine-sulfonic Acid

See, Laurent's Acid

Naphthalidinic Acid

See, Laurent's Acid

Naphthalin

See, Naphthalene

Naphthapyrogallol

1:2:3-Trihydroxy-naphthalene (*not considered herein*)

α-Naphthaquinol

1:4-Dihydroxy-naphthalene (*not considered herein*)

β-Naphthaquinol

1:2-Dihydroxy-naphthalene (*not considered herein*)

1:2-Naphthaquinone

See, 1:2-Naphthoquinone (*C. A. nomen.*)

α-Naphthaquinone

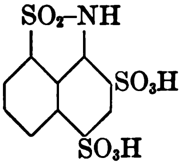
1:4-Naphthoquinone (*not considered herein*)

β-Naphthaquinone

See, 1:2-Naphthoquinone

1:8-Naphthasultam-2:4-disulfonic Acid

4-Amino-4:5-sultam-1:3:5-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)



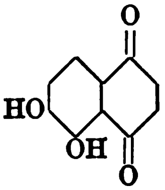
$=C_{10}H_7NO_8S_3=365$

Formation.—The acid sodium 1-naphthylamine-4:8-disulfonate is sulfonated with two parts of 40 per cent oleum, and warmed to 80–90°. This warming is continued until a sample no longer diazotizes and does not form a dye with diazotized sulfanilic acid

Literature.—Cain, Intermediate Products (2d Ed.), 201

Uses.—For preparation of 1-amino-8-naphthol-2:4-disulfonic Acid

Naphthazarin (*C. A. nomen.*)
5:6-Dihydroxy-1:4-naphthoquinone
5:6-Dihydroxy-α-naphthoquinone
1:2-Dihydroxy-naphthoquinone
Oxy-juglone



$=C_{10}H_6O_4=190$

Formation.—Crude dinitro-naphthalene (a mixture of 1:5- and 1:8-dinitro-naphthalene) is treated with oleum and sulfur

Literature.—Georgievics and Grandmougin, Dye Chemistry, 333
Cf. Lange, Zwischenprodukte, #2759
Schultz, Farbstofftabellen (1914), #774
Thorpe, Dic. Chemistry, **3**, 656, 569

Dyes Derived from Naphthazarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
774	Alizarin Black	I '14:—205,439 I '20:— 17,421	[$NaHSO_3$]	M
775	Alizarin Dark Green W		Phenol	M

1:2-β-Naphthazoledione (*C. A. nomen.*)

See, β-Naphthisatin

o-Naphthionic Acid

See, 1-Naphthylamine-2-sulfonic Acid

Naphthionic Acid

Naphtholic Acid

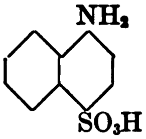
Piria's Acid

1-Naphthylamine-4-sulfonic Acid

1-Amino-naphthalene-4-sulfonic Acid

4-Amino-1-naphthalene-sulfonic Acid (*C. A. numbering*)

Note.—C. A. nomenclature is Naphthionic Acid, but C. A. numbers from the $-SO_3H$ *group, instead of from* $-NH_2$ *group, as is the usual procedure*



$= C_{10}H_9NO_3S = 223$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—1,462,216 lbs.
Manufactured '19:—2,008,189 lbs.
Manufactured '20:—3,773,191 lbs.

FORMATION.—By "baking" α-naphthylamine and sulfuric acid plus a little oxalic acid in pans in an oven

LITERATURE.—Cain, Intermediate Products (2d Ed.), 189
Lange, Zwischenprodukte, #2359
Thorpe, Dic. Chemistry, 3, 590

Dyes Derived from Naphthionic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
52	Archil Substitute V		p-Nitro-aniline	A
91	Anthracyl Chrome Green AD	I '14:— 4,596 M '18:— ? I '20:— 3,316	Picramic Acid	ACr

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
160	Naphthylamine Brown Fast Brown N	I '14:— 68,281 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	α-Naphthol	ACr
161	Fast Red A	I '14:— 46,359 M '17:—191,424 M '18:—242,215 M '19:—267,582 I '20:— 948 M '20:—433,989	β-Naphthol	A
163	Azo Rubine	I '14:—230,763 M '17:—197,621 M '18:— 79,779 M '19:—187,264 I '20:— 1,102 M '20:—470,949	Nevile-Winther's Acid	A
164	Fast Red VR	I '14:— 20,714 M '17:— ? M '18:— ? M '19:— ? I '20:— 6,290 M '20:— ?	1-Naphthol-5-sulfonic Acid	ACr
165	Azo Red A		1-Naphthol-3: 6-disulfonic Acid	A
166	Fast Red E	I '14:— 2,473 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Schaeffer's Acid	A
167	Croceine Scarlet 3BX	I '14:— 13,101 M '17:— ? M '18:— ? M '19:— ? I '20:— 651 M '20:— ?	Croceine Acid	A

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
168	Amaranth	I '14:— 86,067 M '17:— 66,069 M '18:— 73,539 M '19:—294,416 I '20:— 110 M '20:—204,958	R Acid	A
169	Cochineal Red A	I '14:— 32,645 M '17:— ? M '18:— ? M '19:—231,519 M '20:—288,945	G Acid	A
170	Ponceau 6R		2-Naphthol-3: 6: 8-trisulfonic Acid	A
171	Chromotrope 8B	M '18:— ?	Chromotropic Acid	A
	DISAZO DYES			
209	Terra Cotta FC	I '14:— 551	Primuline *or* Dehydro-thio-toluidine-sulfonic Acid *m*-Phenylene-diamine	D
213	Fast Brown	I '14:— 3,206 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol Naphthionic Acid (2 mols)	A
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	H Acid β-Naphthol	A
307	Congo Red	I '14:— 20,629 M '17:— ? M '18:—587,153 M '19:—873,734 M '20:— 1,502,630	Benzidine Naphthionic Acid (2 mols)	D

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
309	Glycine Red		Benzidine a-Naphthyl-glycine	D
311	Orange TA	I '14:— 602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Cresol	D
312	Congo Corinth G	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Benzidine Nevile-Winther's Acid	D
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Benzidine Croceine Acid	D
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Benzidine Salicylic Acid	D
356	Dianol Red 2B	I '14:— 4,422 I '20:— 17,632	Dichloro-benzidine Naphthionic Acid (2 mols)	D
363	Benzo Purpurin 4B	I '14:—351,712 M '17:— ? M '18:—356,522 M '19:—288,021 I '20:— 3,492 M '20:—617,629	Tolidine Naphthionic Acid (2 mols)	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Tolidine Broenner's Acid	D

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
369	Brilliant Purpurin R	I '14:— 8,051	Tolidine Amino-R Acid	D
374	Congo 4R Congo Red 4R	M '18:— ?	Tolidine Resorcinol	D
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Tolidine Nevile-Winther's Acid	D
405	Benzopurpurin 10B	I '14:— 47,768 M '18:— ? M '19:— ? I '20:— 2,205 M '20:— 41,265	Dianisidine Naphthionic Acid (2 mols)	D
407	Azo Violet		Dianisidine Nevile-Winther's Acid	D
	TRISAZO DYES			
479	Dianil Black R		Benzidine Chromotropic Acid *m*-Phenylene-diamine	D
481	Azo Corinth		Tolidine Resorcinol 3-Amino-1-phenol-4-sulfonic Acid	D
	TETRAKISAZO DYES			
487	Benzo Brown B	I '14:— 438 M '20:— ?	*m*-Phenylene-diamine (3 mols) Naphthionic Acid (2 mols)	D
488	Toluylene Brown R	I '14:— 201	3:5-Diamino-*p*-toluene-sulfonic Acid *m*-Phenylene-diamine (2 mols) Naphthionic Acid (2 mols)	D

Dyes Derived from Naphthionic Acid (*continued*)

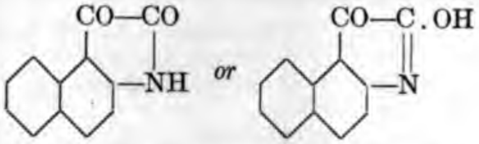
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TETRAKISAZO DYES (*continued*)			
490	Cotton Brown A	I '14:— 29,074	Benzidine *m*-Phenylene-diamine (2 mols) Naphthionic Acid (2 mols)	D
	DIPHENYL-NAPHTHYL-METHANE DYE			
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Hydrol [Substitution of NH_2 by SO_3H; Oxidation]	A

β-Naphthisatin

2-Naphthisatin

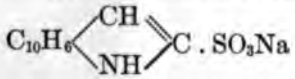
1: 2-β-Naphthazoledione (*C. A. nomen. for keto form*)

1: 2-Diketo-1: 2-dihydro-β-naphthindole

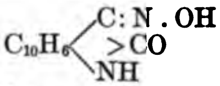


$=C_{12}H_7NO_2=197$

FORMATION.—β-Naphthylamine is reacted with glyoxal sodium bisulfite compound forming β-naphthindol-sulfonate



$$C_{10}H_6{<}\begin{matrix}CH\\NH\end{matrix}{>}C.SO_3Na$$

By adding acetic acid and sodium nitrite to a solution of this latter body in warm water, there results isonitroso-naphthoxindole  $C_{10}H_6{<}\begin{matrix}C:N.OH\\ >CO\\ NH\end{matrix}$, which upon being boiled with sulfuric acid forms the β-naphthisatin

LITERATURE.—Beilstein, Organische Chemie (2 auf.) II, 624; II spl. 342
Cf. Lange, Zwischenprodukte, #2965

Dyes Derived from β-Naphthisatin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
891	Ciba Green G	I '14:— 119	β-Naphisatin (2 mols) [Bromination]	V
892	Helindone Green G	I '20:— 1,248	β-Naphthisatin (2 mols) [Bromination]	V

2-Naphthisatin

See, β-Naphthisatin

1-Naphthol

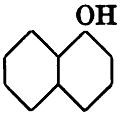
See, α-Naphthol

2-Naphthol

See, β-Naphthol

α-Naphthol

1-Naphthol (*C. A. nomen.*)



$= C_{10}H_8O = 144$

STATISTICS.—Imported '14:—405,578 lbs.
Manufactured '17:— 72,329 lbs.
Manufactured '18:—136,723 lbs.
Manufactured '19:—135,025 lbs.
Manufactured '20:— ?

FORMATION.—(1)Naphthalene is sulfonated cold to α-naphthalenesulfonic acid, which is then fused with caustic soda to form the α-naphthol. (2) α-Naphthylamine hydrochloride or sulfate is hydrolyzed to α-Naphthol by heating with water in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 212
Lange, Zwischenprodukte, #2269–2271
Thorpe, Dic. Chemistry, **3**, 614

Dyes Derived from α-Naphthol

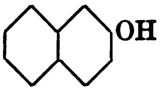
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITRO DYES			
6	Martius Yellow	I ’14:— 3,295 I ’20:— 26	[Dinitration]	A
7	Naphthol Yellow S	I ’14:—251,222 M ’17:— ? M ’18:— ? M ’19:— ? M ’20:— ?	[Dinitration, Sulfonation]	A
	MONOAZO DYES			
105	Sudan Brown	M ’17:— ? M ’18:— ? M ’19:— ?	α-Naphthylamine	SS
144	Orange I	I ’14:— 8,305 M ’17:— ? M ’18:— ? M ’19:— ? I ’20:— 1,323 M ’20:— 14,684	Sulfanilic Acid	A
160	Naphthylamine Brown Fast Brown N	I ’14:— 68,281 M ’17:— ? M ’18:— ? M ’19:— ? M ’20:— ?	Naphthionic Acid	ACr
172	Fast Brown 3B	I ’14:— 1,477	Broenner’s Acid	A
180	Erio Chrome Blue Black B	I ’14:— 57,000 M ’17:— 9,326 M ’18:— ? M ’19:— ? I ’20:— 20,371 M ’20:— 29,255	1-Amino-2-naphthol-4-sulfonic Acid	ACr
183	Erio Chrome Black T	I ’14:—129,550 M ’18:— ? M ’19:— ? I ’20:— 2,624 M ’20:— ?	Nitro-1-amino-2-naphthol-4-sulfonic Acid	ACr

Dyes Derived from α-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
212	Fast Brown G Acid Brown G	I '14:— 17,407 I '20:— 485	Sulfanilic Acid (2 mols)	A
214	Fast Brown O	I '14:— 2,000	Xylidine-sulfonic Acid (2 mols)	A
	INDOPHENOL DYE			
619	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	Nitroso-dimethyl-aniline *or* Dimethyl-*p*-phenylene-diamine	V
	SULFUR DYE			
731	Thiophor Indigo CJ		Dimethyl-*p*-phenylene-diamine [$S+Na_2S$]	S
895	INDIGO GROUP DYE			
	Alizarin Indigo 3R	I '20:— 3,514	Dibromo-isatin Chloride	V

β-Naphthol

2-Naphthol (*C. A. nomen.*)



$=C_{10}H_8O=144$

STATISTICS.—Imported '14:— 1,264,525 lbs.
Manufactured '17:— 5,952,772 lbs.
Manufactured '18:— 5,254,637 lbs.
Manufactured '19:— 4,916,416 lbs.
Manufactured '20:—11,920,714 lbs.

FORMATION.—Naphthalene is sulfonated to β-naphthalene-sulfonic acid; this is fused with caustic soda, and the resulting β-naphthol is isolated and purified

LITERATURE.—Cain, Intermediate Products (2d Ed.), 212
Thorpe, Dic. Chemistry, **3**, 614, 622

Dyes Derived from β-Naphthol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITROSO DYE			
2	Gambine Y Fast Printing Green		[Nitroso-derivative]	M
	MONOAZO DYES			
36	Sudan I Oil Orange	I '14:— 4,554 M '17:— 32,455 M '18:— 29,670 M '19:— 75,868 M '20:—116,624	Aniline	SS
46	*m*-Nitraniline Orange		*m*-Nitro-aniline	MF
56	Paranitraniline Red	I '14:—49,847 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	*p*-Nitro-aniline	MF
72	Pigment Orange R		*p*-Nitro-*o*-toluidine	CL MF
73	Pigment Fast Red HL Lithol Fast Scarlet R Helio Fast Red RL	I '14:— 49,708 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,001 M '20:— ?	*m*-Nitro-*p*-toluidine	CL
74	Tannin Orange R	I '14:— 2,202 I '20:— 347	*o*- *and* *p*-Amino-benzyl-dimethyl-amine	B
76	Sudan II	I '14:— 501 M '17:— 27,595 M '18:— 23,692 M '19:— ? M '20:—170,658	Xylidine	SS
86	Azarine S		2-Amino-4: 6-dichloro-phenol	M
93	Pigment Purple A Sudan R	I '14:— 99	*o*-Anisidine	CL

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
97	Chloranisidine Scarlet		Chloro-anisidine	MF
98	Naphthol Pink Nitrosamine Pink BX	I '14:— 99	*p*-Nitro-*o*-anisidine	MF
99	Tuscaline Orange G		*m*-Nitro-*o*-anisidine	CL MF
106	Carmine Naphth Garnet Autol Red RL	I '14:— 6,565 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	α-Naphthylamine	CL
115	Azo Turkish Red		β-Naphthylamine	MF
126	Indoin Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	Safranine *or* *m*-Tolylene-diamine *o*-Toluidine Aniline	B
131	Permanent Orange R		2-Amino-6-chloro-benzene-sulfonic Acid	CL
132	Lake Red P	I '14:— 60,345 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,750	*p*-Nitro-aniline-*o*-sulfonic Acid	CL
145	Orange II	I '14:—128,877 M '17:—712,586 M '18:—916,890 M '19:— 1,133,925 I '20:— 2,265 M '20:— 1,850,341	Sulfanilic Acid	A

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
148	Fast Orange O	I '14:— 1,250 M '17:— ?	*o*-Nitro-aniline-*p*-sulfonic Acid	CL
151	Orange T and RO	I '14:— 90,747 M '17:— ? M '19:— ? I '20:— 20 M '20:— ?	*o*-Toluidine-*m*-sulfonic Acid	A
153	Lake Red C	I '14:—306,607 M '19:— ? I '20:— 4,105 M '20:— ?	2-Chloro-5-toluidine-4-sulfonic Acid	CL
156	Acid Alizarin Violet N Palatine Chrome Violet	I '14:— 1,199 M '19:— ? M '20:— ?	*o*-Amino-phenol-*p*-sulfonic Acid	ACr
159	Acid Alizarin Black R	I '14:— 16,800 M '19:— ? I '20:— 439 M '20:— ?	2-Amino-6-nitro-1-phenol-4-sulfonic Acid	M
161	Fast Red A	I '14:— 46,359 M '17:—191,424 M '18:—242,215 M '19:—267,582 I '20:— 948 M '20:—433,989	Naphthionic Acid	A
162	Brilliant Fast Red G		Laurent's Acid	A
173	Lithol Red R	I '14:—281,963 M 17:— ? M '18:—353,104 M '19:—269,169 M '20:— ?	2-Naphthylamine-1-sulfonic Acid	CL

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
174	Double Brilliant Scarlet	I '14:—210,429 M '17:— ? M '20:— ?	Broenner's Acid	A
175	Ponceau for Silk	I '14:— 727	2-Naphthylamine-8- *and* 5-sulfonic Acids	A
181	Palatine Chrome Black 6B Salicine Black U	I '14:—248,721 M '17:— ? M '18:—469,159 M '19:—739,372 M '20:— 2,001 M '20:— 1,074,248	1-Amino-2-naphthol-4-sulfonic Acid	ACr
184	Erio Chrome Black A	I '14:— 96,570 M '17:— ? M '18:— ? M '19:—686,700 I '20:— 14,262 M '20:— ?	Nitro-1-amino-2-naphthol-4-sulfonic Acid	ACr
185	Anthracene Chrome Black	I '14:— 51,577 I '20:— 2,339	2-Amino-3-naphthol-6-sulfonic Acid	M
193	Clayton Cloth Red Stanley Red	I '14:— 100 M '18:— ? M '19:— ? M '20:— ?	Dehydro-thio-*p*-toluidine-sulfonic Acid	A
200	Lake Red D	I '14:— 2,428 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Anthranilic Acid	CL
	DISAZO DYES			
223	Sudan III	I '14:— 2,409 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Amino-azo-benzene	ss MF

Dyes Derived from β-Naphthol *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES *(continued)*			
232	Sudan IV	I '14:— 51 M '17:— 13,334 M '18:— 14,904 M '19:— ? M '20:— ?	*o*-Amino-azo-toluene	SS MF
239	Azotol C		Amino-chrysoidine *or* *p*-Amino-acetanilide *and* *m*-phenylene-diamine *or* *N*-Dimethyl-*p*: *p′*-diamino-azo-benzene	MF
240	Janus Red B	I '14:— 250 I '20:— 176	*m*-Amino-phenyl-tri-methyl-ammonium Chloride *m*-Toluidine	B
246	Cloth Scarlet G	I '14:— 9 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Amino-azo-benzene-sulfonic Acid	A
247	Double Scarlet Scarlet EC	I '14:— 39,522 M '17:— ? M '18:— 74,203 M '19:— ? M '20:— ?	Amino-azo-benzene-disulfonic Acid	A
252	Cloth Scarlet R		*o*-Amino-azo-toluene-sulfonic Acid	M
260	Erio Chrome Verdon A	I '14:— 882	Sulfanilic Acid *m*-Amino-*p*-cresol	ACr
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	Naphthionic Acid H Acid	A

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
271	Diamine Blue 6G		Amino-G Acid 1-Amino-2-naphthol Ethyl Ether	D
288	Acid Alizarine Black SE Palatine Chrome Black F	I ’14:— 19,185 I ’20:— 34,302	2: 6-Diamino-phenol-4-sulfonic Acid β-Naphthol (2 mols)	ACr
289	Acid Alizarine Black SN Palatine Chrome Black S	M ’17:— ? M ’18:— ? M ’19:— ?	2: 6-Diamino-phenol-4-sulfonic Acid Schaeffer’s Acid	ACr
318	Benzidine Puce		Benzidine β-Naphthol (2 mols)	MF
322	Trisulfon Violet B	I ’14:— 1,124 M ’17:— ? M ’18:— ? M ’19:— ? I ’20:— 7,927 M ’20:— ?	Benzidine 1-Naphthol-3: 6: 8-trisulfonic Acid	D
378	Trisulfon Blue R	I ’14:— 911 M ’19:— ? M ’20:— ?	1-Naphthol-3: 6: 8-trisulfonic Acid Tolidine	D
400	Milling Scarlet 4R Acid Anthracene Red 3B	I ’14:— 18,330 I ’20:— 2,336	o-Tolidine-disulfonic Acid β-Naphthol (2 mols)	A
406	Diazurine B		Dianisidine 1-Naphthylamine-6-sulfonic Acid (2 mols) β-Naphthol (2 mols on fiber)	D

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
408	Dianisidine Blue	I '14:— 240	Dianisidine β-Naphthol (2 mols)	D
409	Trisulfon Blue C	I '14:— 813	Dianisidine 1-Naphthol-3:6:8-trisulfonic Acid	D
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 351 M '20:— ?	Dianisidine 1-Amino-8-naphthol-2:4-disulfonic Acid	D
434	Coomassie Navy Blue	I '20:— 42,357	1:4-Naphthylene-diamine-3-sulfonic Acid R Acid	A
	DIPHENYL-NAPHTHYL-METHANE DYE			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	Ketone (Sulfonation)	A
	OXAZINE DYES			
649	New Blue R Meldola's Blue Cotton Blue	I '14:— 32,509 M '17:— ? M '18:— 22,513 M '19:— ? I '20:— 5,240 M '20:— ?	Nitroso-dimethyl-aniline	B
650	New Blue B		Nitroso-dimethyl-aniline (2 mols)	B

Dyes Derived from β-Naphthol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
651	New Methylene Blue GG		Nitroso-dimethyl-aniline [Dimethyl-amine, Oxidation] *or* [Meldola's Blue, Dimethyl-amine, Oxidation]	B
652	New Fast Blue F	I '14:— 2,502	Nitroso-dimethyl-aniline Hydrol *or* [Meldola's Blue; Hydrol]	B

α-Naphthol-carboxylic Acid

See, 1-Hydroxy-2-naphthoic Acid

β-Naphthol-carboxylic Acid

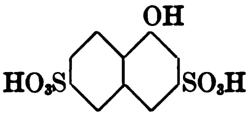
See, 3-Hydroxy-2-naphthoic Acid

1-Naphthol-3:6-disulfonic Acid (*C. A. nomen.*)

R G Acid

G R Acid

α-Naphthol-disulfonic Acid R G



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

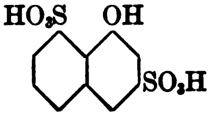
Formation.—(1) By fusing sodium naphthalene-1:3:6-trisulfonate with half its weight of caustic soda and half its weight of water in an autoclave. (2) By diazotizing 1-naphthylamine-3:6-disulfonic acid and adding to boiling dilute sulfuric acid

Literature.—Cain, Intermediate Products (2d Ed.), 218
Lange, Zwischenprodukte, #2636
Thorpe, Dic. Chemistry, 3, 619

Dyes Derived from 1-Naphthol-3:6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
64	Azo Acid Red B Lanafuchsine	I '14:— 78,305 M '17:— ? M '18:— ? M '19:— 15,272 I '20:— 674 M '20:— ?	*p*-Amino-acetanilide	A
81	Palatine Scarlet A Brilliant Cochineal 2R	I '14:— 7,510	*m*-Xylidine	A
109	Palatine Red A	I '14:— 300 M '18:— ? M '19:— ?	α-Naphthylamine	A
165	Azo Red A		Naphthionic Acid	A
	Disazo Dyes			
225	Croceine AZ	I '14:— 500 I '20:— 100	Amino-azo-benzene	A

1-Naphthol-3:8-disulfonic Acid (*C. A. nomen.*)
Andresen's Acid
ε-Acid *or* Epsilon Acid
α-Naphthol-ε-disulfonic Acid
Disulfo Acid E



$=C_{10}H_8O_7S_2=304$

STATISTICS.—Manufactured '20:— ?

FORMATION.—Heat a solution of the acid sodium salt of 1-naphthylamine-3: 8-disulfonic acid in an autoclave for 5 hours at 180°

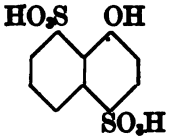
LITERATURE.—Cain, Intermediate Products (2d Ed.), 219
Lange, Zwischenprodukte, #2638, 2639
Thorpe, Dic. Chemistry, 3, 619

Dyes Derived from 1-Naphthol-3: 8-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
100	Eosamine B	I '14:— 1,914 I '20:— 1,600	*m*-Amino-*p*-cresol-methyl ether	A
117	Erica 2 GN	I '14:— 1,171 M '19:— ? I '20:— 337	Dehydro-thio-*p*-toluidine	D
121	Erica B	I '14:— 5,349 M '19:— ? I '20:— 2,393	Dehydro-thio-*m*-xylidine	D
	DISAZO DYES			
325	Columbia Blue R	I '14:— 3,071	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D
387	Columbia Blue G	I '14:— 7,094	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D
	TRISAZO DYES			
451	Congo Fast Blue R	I '14:— 4,449 M '18:— ? I '20:— 723	Tolidine α-Naphthylamine 1-Naphthol-3: 8-disulfonic Acid (2 mols)	D
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1,821	Dianisidine α-Naphthylamine 1-Naphthol-3: 8-disulfonic Acid (2 mols	D

1-Naphthol-4: 8-disulfonic Acid (*C. A. nomen.*)

Schoellkopf's Acid
α-Naphthol-disulfonic Acid Sch
α-Naphthol-δ-disulfonic Acid
α-Naphthol-disulfonic Acid S
S Acid



$=C_{10}H_8O_7S_2=304$

Statistics.—Manufactured '19:— ?

Formation.—From 1-naphthylamine-4: 8-disulfonic acid by diazotizing and running this diazo solution into dilute sulfuric acid. This latter is now boiled to complete the decomposition

Literature.—Cain, Intermediate Products (2d Ed.), 219
Lange, Zwischenprodukte, #2647
Thorpe, Dic. Chemistry, 3, 620

Dyes Derived from 1-Naphthol-4: 8-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
80	Wool Scarlet R	I '14:— 39,888	Xylidine	A
95	Azo Cochineal Cochineal Scarlet B	I '14:— 952	*o*-Anisidine	A
110	Buffalo Rubine		α-Naphthylamine	A
118	Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	Dehydro-thio-*p*-toluidine	D
	Disazo Dyes			
226	Croceine B		Amino-azo-benzene	A
235	Croceine 3B	M '19:— ? M '20:— ?	Amino-azo-toluene	A
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Benzidine Croceine Acid	D

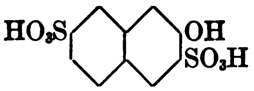
2-Naphthol-3: 6-disulfonic Acid

See, R Acid

2-Naphthol-3: 7-disulfonic Acid (*C. A. nomen.*)

β-Naphthol-δ-disulfonic Acid

β-Naphthol-disulfonic Acid F



$= C_{10}H_8O_7S_2 = 304$

Formation.—2-Naphthol-7-sulfonic acid is heated with 66° sulfuric acid for a considerable time at 120°

Literature.—Lange, Zwischenprodukte, #2653, 2654
Thorpe, Dic. Chemistry, **3**, 627

Dye Derived from 2-Naphthol-3: 7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
402	Disazo Dye Diamine Blue Black E		Ethoxy-benzidine Gamma Acid	D

2-Naphthol-6: 8-disulfonic Acid

See, G Acid

α-Naphthol-δ-disulfonic Acid

See, 1-Naphthol-4: 8-disulfonic Acid

α-Naphthol-ε-disulfonic Acid

See, 1-Naphthol-3: 8-disulfonic Acid

α-Naphthol-disulfonic Acid GR

See, 1-Naphthol-3: 6-disulfonic Acid

α-Naphthol-disulfonic Acid RG

See, 1-Naphthol-3: 6-disulfonic Acid

α-Naphthol-disulfonic Acid S
See, 1-Naphthol-4: 8-disulfonic Acid

α-Naphthol-disulfonic Acid Sch
See, 1-Naphthol-4: 8-disulfonic Acid

β-Naphthol-α-disulfonic Acid
See, R Acid

β-Naphthol-β-disulfonic Acid
See, G Acid

β-Naphthol-γ-disulfonic Acid
See, G Acid

β-Naphthol-δ-disulfonic Acid
See, 2-Naphthol-3: 7-disulfonic Acid

β-Naphthol-disulfonic Acid C
2-Naphthol-4: 8-disulfonic Acid (*not considered herein*)

β-Naphthol-disulfonic Acid F
See, 2-Naphthol-3: 7-disulfonic Acid

β-Naphthol-disulfonic Acid G
See, G Acid

β-Naphthol-disulfonic Acid R
See, R Acid

Naphtholic Acid
See, Naphthionic Acid

1-Naphthol-4-sulfonic Acid
See, Nevile-Winther's Acid

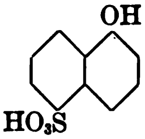
1-Naphthol-5-sulfonic Acid (*C. A. nomen.*)

L Acid

Cleve's Acid

α-Naphthol-sulfonic Acid C

α-Naphthol-sulfonic Acid L



$= C_{10}H_8O_4S = 224$

STATISTICS.—Imported '14:—25,126 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—(1) From naphthalene-1:5-disulfonic acid by fusion with caustic soda. (2) From 1-naphthylamine-5-sulfonic acid by diazotizing, and boiling the diazo solution with dilute sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 218
Lange, Zwischenprodukte, #2422–2424
Thorpe, Dic. Chemistry, **3**, 617

Dyes Derived from 1-Naphthol-5-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
78	Cochineal Scarlet 4R		Xylidine	A
108	Double Ponceau R		α-Naphthylamine	A
164	Fast Red VR	I '14:— 20,714 M '17:— ? M '18:— ? M '19:— ? I '20:— 6,290 M '20:— ?	Naphthionic Acid	ACr

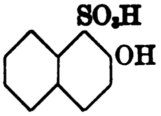
Dyes Derived from 1-Naphthol-5-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	Amino-salicylic Acid α-Naphthylamine	ACr
411	Benzoazurine 3G	I '20:— 201	Dianisidine 1-Naphthol-5-sulfonic Acid (2 mols)	D

2-Naphthol-1-sulfonic Acid

Tobias Acid

(*Falsely called* β-naphthyl-sulfuric Acid)



$= C_{10}H_8O_4S = 224$

Statistics.—Manufactured in 1918, 1919, 1920 in indeterminate amounts

Formation.—By sulfonating β-naphthol with 2–2½ parts of 90–92 per cent sulfuric acid at about 40°

Literature.—Cain, Intermediate Products (2d Ed.), 222
Lange, Zwischenprodukte, #2427
Thorpe, Dic. Chemistry, **3**, 624

Uses.—For preparation of 2-naphthylamine-1-sulfonic acid

2-Naphthol-6-sulfonic Acid

See, Schaeffer's Acid

2-Naphthol-7-sulfonic Acid (*C. A. nomen.*)

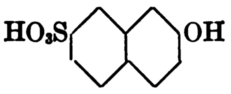
β-Naphthol-δ-sulfonic Acid

β-Naphthol-sulfonic Acid F

F Acid

Monosulfonic Acid F

Cassella's Acid



$= C_{10}H_8O_4S = 224$

STATISTICS.—Imported '14:—1,996 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By fusing sodium naphthalene-2:7-disulfonate with caustic soda solution in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 224
Lange, Zwischenprodukte, #2434
Thorpe, Dic. Chemistry, **3**, 625

Dyes Derived from 2-Naphthol-7-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
56	Paranitraniline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ?	*p*-Nitro-aniline [β-Naphthol]	MF

2-Naphthol-8-sulfonic Acid

See, Croceine Acid

α-Naphthol-sulfonic Acid δ

1-Naphthol-8-sulfonic Acid (*not considered herein*)

α-Naphthol-sulfonic Acid C
See, 1-Naphthol-5-sulfonic Acid

α-Naphthol-sulfonic Acid L
See, 1-Naphthol-5-sulfonic Acid

α-Naphthol-sulfonic Acid NW
See, Nevile-Winther's Acid

α-Naphthol-sulfonic Acid S
1-Naphthol-8-sulfonic Acid (*not considered herein*)

β-Naphthol-α-sulfonic Acid of Armstrong and Schultz
See, Schaeffer's Acid

β-Naphthol-α-sulfonic Acid (*of Bayer & Co.'s patents*)
See, Croceine Acid

β-Naphthol-β-sulfonic Acid
See, Schaeffer's Acid

β-Naphthol-γ-sulfonic Acid
2-Naphthol-5-sulfonic Acid (*not considered herein*)

β-Naphthol-δ-sulfonic Acid
See, 2-Naphthol-7-sulfonic Acid

β-Naphthol-sulfonic Acid B
See, Croceine Acid

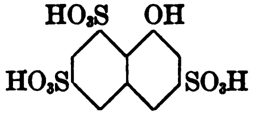
β-Naphthol-sulfonic Acid F
See, 2-Naphthol-7-sulfonic Acid

β-Naphthol-sulfonic Acid S
See, Schaeffer's Acid

β-Naphthol-sulfonic Acid Schaeffer

See, Schaeffer's Acid

1-Naphthol-3:6:8-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_8O_{10}S_3 = 384$

STATISTICS.—Imported '14:—6,443 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From 1-naphthylamine-3:6:8-trisulfonic acid by diazotizing in the presence of a large excess of sulfuric acid and then boiling and purifying

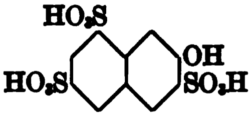
LITERATURE.—Cain, Intermediate Products (2d Ed.), 221
Lange, Zwischenprodukte, #2785, 2786
Thorpe, Dic. Chemistry, 3, 621

Dyes Derived from 1-Naphthol-3:6:8-trisulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	Benzidine β-Naphthol	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	Tolidine β-Naphthol	D
409	Trisulfon Blue B	I '14:— 813	Dianisidine β-Naphthol	D

2-Naphthol-3: 6: 8-trisulfonic Acid (*C. A. nomen.*)

β-Naphthol-trisulfonic Acid



$=C_{10}H_8O_{10}S_3=384$

Statistics.—Manufactured '19:— ?

Formation.—From β-naphthol by sulfonation with 2 parts of concentrated sulfuric acid at 70–80°, then with 2 more parts of concentrated sulfuric acid at 120°, and finally with 2 parts of 40 per cent oleum at 150°

Literature.—Cain, Intermediate Products (2d Ed.), 229
Lange, Zwischenprodukte, #2792
Thorpe, Dic. Chemistry, 3, 628
Ullmann, Ensy. tech. Chemie, 8, 351

Dyes Derived from 2-Naphthol-3: 6: 8-trisulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dye			
170	Ponceau 6R		Naphthionic Acid	A
	Disazo Dye			
228	Ponceau 5R Erythrine P	I '14:— 2,880 M '17:— ? M '18:— ?	Amino-azo-benzene	A

β-Naphthol-trisulfonic Acid

See, 2-Naphthol-3: 6: 8-trisulfonic Acid

α-Naphthol-trisulfonic Acid S

1-Naphthol-2: 4: 8-trisulfonic Acid (*not considered herein*)

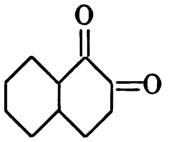
Naphtho-picric Acid

2: 4: 5-Trinitro-1-naphthol (*not considered herein*)

1: 2-Naphthoquinone (*C. A. nomen.*)

β-Naphthaquinone

1: 2-Naphthaquinone



$= C_{10}H_6O_2 = 158$

FORMATION.—From Orange II as follows: Sulfanilic acid is diazotized and coupled with β-naphthol to form Orange II. This azo dye is reduced with stannous chloride to 1-amino-2-naphthol, which is oxidized with sodium bichromate and sulfuric acid to β-naphthoquinone

LITERATURE.—Thorpe, Dic. Chemistry, **3**, 654
Lange, Zwischenprodukte, #23, 648, 2408

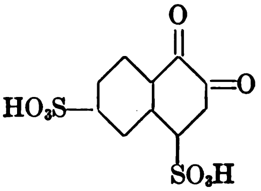
Dye Derived from 1: 2-Naphthoquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYE			
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid	M

1: 2-Naphthoquinone-4: 6-disulfonic Acid

β-Naphthoquinone-4: 6-disulfonic Acid

3: 4-Dihydro-3: 4-diketo-1: 7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_6O_8S_2 = 318$

FORMATION.—1-Nitroso-2-naphthol-6-sulfonic acid is treated with bisulfite forming 1-amino-2-naphthol-4: 6-disulfonic acid. This latter body is now oxidized with nitric acid under 15°, resulting in 1: 2-naphthoquinone-4: 6-disulfonic acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **8**, 358
Cf. Lange, Zwischenprodukte, #2408
Thorpe, Dic. Chemistry, **3**, 657

Dyes Derived from 1: 2-Naphthoquinone-4: 6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	THIAZINE DYES			
666	Indochromogen S		Diethyl-*p*-phenylene-diamine-thiosulfonic-Acid	M
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '19:— 3,214 M '20:— ?	Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid	M

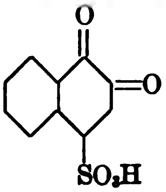
β-Naphthoquinone-4: 6-disulfonic Acid

See, 1: 2-Naphthoquinone-4: 6-disulfonic Acid

1: 2-Naphthoquinone-4-sulfonic Acid

β-Naphthoquinone-4-sulfonic Acid

3: 4-Dihydro-3: 4-diketo-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_6O_5S = 238$

FORMATION.—2-Amino-1-naphthol-4-sulfonic acid or 1-amino-2-naphthol-4-sulfonic acid is oxidized with nitric acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, **8**, 358
Thorpe, Dic. Chemistry, **3**, 657
Cf. Lange, Zwischenprodukte, #2631

Dyes Derived from 1:2-Naphthoquinone-4-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
656	Alizarin Green G	M '19:— ?	1-Amino-2-naphthol-6-sulfonic Acid	M
657	Alizarin Green B	I '14:— 551	2-Amino-1-naphthol-4-sulfonic Acid	M

β-Naphthoquinone-4-sulfonic Acid

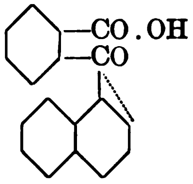
See, 1:2-Naphthoquinone-4-sulfonic Acid

Naphtho-resorcin

1:3-Dihydroxy-naphthalene (*not considered herein*)

Naphthoyl-benzoic Acid

o-1-Naphthoyl-*b*enzoic Acid (*C. A. nomen.*)



$= C_{18}H_{12}O_3 = 276$

FORMATION.—From phthalic anhydride and naphthalene by heating together in the presence of benzene and aluminium chloride

LITERATURE.—Lange, Zwischenprodukte, #2812
Schultz, Farbstofftabellen (1914), #758

Dye Derived from Naphthoyl-benzoic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G			CL

Naphthsultam-disulfonic Acid S

1-Naphthylamine-2:4:8-trisulfonic Acid (*not considered herein*)

1-Naphthylamine

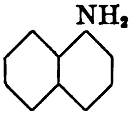
See, α-Naphthylamine

2-Naphthylamine

See, β-Naphthylamine

α-Naphthylamine

1-Naphthylamine (*C. A. nomen.*)
α-Amino-naphthalene
Naphthalidam
Naphthalidine



$= C_{10}H_9N = 143$

STATISTICS.—Imported '14:— 112,226 lbs.
Manufactured '17:—3,516,686 lbs.
Manufactured '18:—2,671,601 lbs.
Manufactured '19:—1,552,828 lbs.
Manufactured '20:—5,177,547 lbs.

FORMATION.—Naphthalene is mononitrated, using mixed acid, and the resulting α-nitro-naphthalene is reduced with iron and hydrochloric acid to α-naphthylamine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 181
Lange, Zwischenprodukte, #2262
Thorpe, Dic. Chemistry, **3**, 586

Dyes Derived from α-Naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
105	Sudan Brown	M' 17:— ? M '18:— ? M '19:— ?	α-Naphthol	ss
106	Carmine Naphth Garnet Autol Red RL	I '14:— 6,565 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	CL
107	Sulfamine Brown A	I '14:— 132 M '18:— ? M '19:— ? I '20:— 2,630 M '20:— ?	Nitroso-β-naphthol	M
108	Double Ponceau R		1-Naphthol-5-sulfonic Acid	A
109	Palatine Red A	I '14:— 300 M '18:— ? M '19:— ?	1-Naphthol-3:6-disulfonic Acid	A
110	Buffalo Rubine		1-Naphthol-4:6-disulfonic Acid	A
111	Fast Red BT	M '17:— ? M '18:— ? M '19:— ?	Schaeffer's Acid	A
112	Fast Red B Bordeaux B	I '14:— 25,821 M '17:—120,595 M '18:—200,415 M '19:—161,862 I '20:— 7,882 M '20:—217,406	R Acid	A
113	Crystal Ponceau	I '14:— 628	G Acid	A
114	Chromotrope 10B	M '19:— ?	Chromotropic Acid	A

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
218	Nigrophor B A S F		1-Amino-8-naphthol-5-sulfonic Acid 2: 5-Dichloro-aniline	MF
220	Palatine Black A	I '14:—299,274 I '20:— 200	1-Amino-8-naphthol-4-sulfonic Acid Sulfanilic Acid	A
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	Aniline Gamma Acid	D
243	Coomassie Wool Black R		Acetyl-*p*-phenylene-diamine Schaeffer's Acid	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	Acetyl-*p*-phenylene-diamine R Acid	A
245	Nyanza Black B		*p*-Nitro-aniline [Reduced] Gamma Acid	D
256	Sulfon Black 3B		Metanilic Acid Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid Phenyl- *or* Tolyl-1-naphthylamine-8-sulfonic Acid	A
258	Naphthalene Acid Black 4B	I '14:— 7,994	Metanilic Acid 1-Naphthylamine-6- *and* 7-sulfonic Acids	A
261	Buffalo Black 10B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid H Acid	A

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
262	Victoria Black B	I '14:— 557	Sulfanilic Acid 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
263	Jet Black R		Aniline-2:4-disulfonic Acid Phenyl-α-naphthylamine	A
265	Sulfoncyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid Phenyl-1-naphthylamine-8-sulfonic Acid	A
266	Naphthylamine Black D	I '14:—152,141 M '17:— ? M '18:— 29,724 M '19:— ? I '20:— 1,687 M '20:— ?	Freund's Acid α-Naphthylamine (2 mols)	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	Freund's Acid Diphenyl-*m*-phenylenediamine	A
267	Phenylene Black		1-Naphthylamine-4:7-disulfonic Acid Diphenyl-*m*-phenylenediamine	A
268	Naphthyl Blue Black N		1-Naphthylamine-4:6- *and* 4:7-disulfonic Acids 1-Amino-2-naphthol Ethyl Ether	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	1-Naphthylamine-4:6- *and* 4:7-disulfonic Acids R Acid	A

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	Amino-G Acid R Acid	A
273	Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	Acetyl-1:4-diamino-naphthalene-6-sulfonic Acid Schaeffer's Acid	D
274	Diaminogen B	I '14:—313,629 I '20:— 18,120	Acetyl-1:4-diamino-naphthalene-6-sulfonic Acid Gamma Acid	D
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	Amino-salicylic Acid Nevile-Winther's Acid *or* 1-Naphthol-5-sulfonic Acid	ACr
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,061	Amino-salicylic Acid 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	ACr
278	Biebrich Patent Black		1-Naphthylamine-6- *and* 7-sulfonic Acids etc.	A
290	Violet Black		Nevile-Winther's Acid *p*-Phenylene-diamine *or* Amino-acetanilide	D
382	Azo Mauve B	M '17:— ? M '20:— ?	Tolidine H Acid	D

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
432	Diamine Cutch Naphthylene Violet		1:5-Naphthylene-diamine-3:7-disulfonic Acid α-Naphthylamine (2 mols)	D
	TRISAZO DYES			
435	Janus Brown B		Trimethyl-*m*-amino-phenyl-ammonium Chloride Aniline *m*-Phenylene-diamine *or* *p*-Amino-benzyl-diethyl-amine Resorcinol *m*-Phenylene-diamine	B
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	Benzidine H Acid (2 mols)	D
442	Direct Black V	I '14:—145,738	Benzidine 2R Acid Gamma Acid	D
443	Direct Indone Blue R		Benzidine 2R Acid H Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine Salicylic Acid H Acid	D
447	Benzo Gray S	I '14:— 802	Benzidine Salicylic Acid Nevile-Winther's Acid	D
450	Benzo Black Blue R		Tolidine Nevile-Winther's Acid (2 mols)	D

Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
451	Congo Fast Blue R	I '14:— 4,449 M '19:— ? I '20:— 723	Tolidine 1-Naphthol-3: 8-disulfonic Acid (2 mols)	D
452	Benzo Indigo Blue		Tolidine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1821	Dianisidine 1-Naphthol-3: 8-disulfonic Acid	D
459	Benzo Black Blue G		Benzidine-disulfonic Acid Nevile-Winther's Acid (2 mols)	D
460	Benzo Black Blue 5G	I '14:— 602	Benzidine-disulfonic Acid 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
	OXAZINE DYE			
653	Nile Blue A	I '14:— 1,518 I '20:— 1,241	5-Diethylamino-2-nitroso-phenol	B
	AZINE DYES			
671	Induline Scarlet	I '14:— 198 I '20:— 154	Ethyl-*p*-toluidine	B
672	Azo Carmine G	I '14:— 17,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 196 M '20:— ?	Aniline (3 mols) [Disulfonation]	A
673	Azo Carmine B	I '20:— 549	Aniline (3 mols) [Trisulfonation]	A

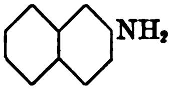
Dyes Derived from α-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
674	Rosinduline 2G	I '20:— 201	Aniline (3 mols) [Trisulfonation, heated to 160°] *or* [Azo Carmine B heated to 160°]	A
693	Milling Blue	I '14:— 3,082	Aniline (3 mols) α-Naphthylamine (2 mols) [Sulfonation]	M
694	Rose Magdala Fast Pink for Silk	I '14:— 597	α-Amino-azo-naphthalene	A

β-Naphthylamine

2-Naphthylamine (*C. A. nomen.*)

β-Amino-naphthalene



$= C_{10}H_9N = 143$

STATISTICS.—Imported '14:—11,204 lbs.
Manufactured '17:— ?
Manufactured '18:—31,317 lbs.
Manufactured '19:—99,597 lbs.
Manufactured '20:— ?

FORMATION.—From β-naphthol by heating in an autoclave with ammonium sulfite and ammonia.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 187
Lange, Zwischenprodukte, #2262
Thorpe, Dic. Chemistry, 3, 598

Dyes Derived from β-Naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
115	Azo Turkish Red		β-Naphthol	MF
116	Sulfamine Brown B		Nitroso-β-naphthol [Sodium bisulfite]	M
	DISAZO DYES			
281	Azidine Fast Scarlet 4BS		o-Toluidine Sulfo-m-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
282	Azidine Fast Scarlet 7BS		β-Naphthylamine (2 mols) Sulfo-m-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
287	Toluylene Orange RR	I '14:— 500	β-Naphthylamine (2 mols) 3:5-Diamino-p-toluene-sulfonic Acid	D
301	Hessian Purple N	I '14:— 465	β-Naphthylamine (2 mols) Diamino-stilbene-disulfonic Acid	D
383	Naphthazurine B	I '14:— 4,782	Tolidine H Acid	D
433	Coomassie Black B		1:4-Naphthylene-diamine-2-sulfonic Acid R Acid	A

Dyes Derived from β-Naphthylamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
541	Brilliant Dianil Blue 6G		β-Naphthylamine (3 mols) Aniline *o*-Toluidine *p*-Toluidine [Disulfonation] *or* β-Naphthylamine (3 mols) [Rosaniline; Disulfonation]	B
	ANTHRAQUINONE DYE			
831	Indanthrene Red BN	I '14:— 6,056 I '20:— 4,766	1-Chloro-anthraquinone-2-carboxylic Acid	V

1-Naphthylamine-3: 6-disulfonic Acid

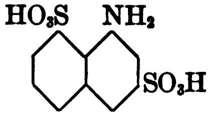
See, Freund's Acid

1-Naphthylamine-3: 8-disulfonic Acid

α-Naphthylamine-ε-disulfonic Acid

ε Acid *or* Epsilon Acid

8-Amino-1: 6-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_6S_2 = 303$

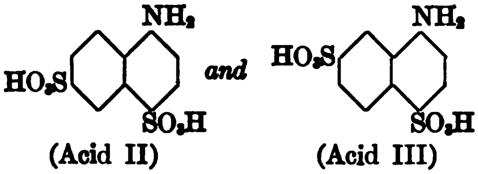
STATISTICS.—Manufactured in 1919 and 1920 but in undisclosed quantities

FORMATION.—Naphthalene-1: 5- *and* 1: 6-disulfonic acids are nitrated and reduced, resulting in 1-naphthylamine-3: 8- *and* 4: 8-disulfonic acids. The separation is effected by crystallizing out the acid sodium salt of 1-naphthylamine-3: 8-disulfonic acid

Literature.—Cain, Intermediate Products (2d Ed.), 196
Lange, Zwischenprodukte, #2575, 2576
Thorpe, Dic. Chemistry, 3, 592

1-Naphthylamine-4:6- *and* 4:7-disulfonic Acids

α-Naphthylamine-disulfonic Acids D
Dahl's Acids II *and* III (*respectively*)
4-Amino-1:6-naphthalene-disulfonic Acid (*C. A. nomen.*)
4-Amino-1:7-naphthalene-disulfonic Acid (*C. A. nomen*)



$= C_{10}H_9NO_6S_2 = 303$

Statistics.—Manufactured '20:— ?

Formation.—From naphthionic acid by sulfonation with 25 per cent oleum

Literature.—Cain, Intermediate Products (2d Ed.), 198
Thorpe, Dic. Chemistry, 3, 593, 594
Lange, Zwischenprodukte, #2577–2582

Dyes Derived from 1-Naphthylamine-4:6- *and* 4:7-disulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
54	Apollo Red B	I '14:— 904	*p*-Nitro-aniline	A
	DISAZO DYES			
267	Phenylene Black	I '14:— 99 M '17:— ? I '20:— 220	α-Naphthylamine Dipheny-*m*-phenylene-diamine [4:7 Acid only]	A
268	Naphthyl Blue Black N		α-Naphthylamine 1-Amino-2-naphthol Ethyl Ether	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	α-Naphthylamine R Acid	A

1-Naphthylamine-4:8-disulfonic Acid

δ Acid *or* Delta Acid

Schoellkopf's Acid

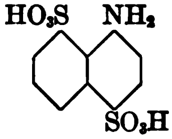
Disulfo-acid S

4-Amino-1:5-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

α-Naphthylamine-*δ*-disulfonic Acid

α-Naphthylamine-disulfonic Acid S

S Acid



$=C_{10}H_9NO_6S_2=303$

Statistics.—Manufactured in 1919 and 1920 in undisclosed amounts

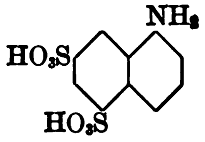
Formation.—When naphthalene-1:5- *and* 1:6-disulfonic acids are nitrated and reduced, there is formed a mixture of 1-naphthylamine-3:8- *and* 4:8-disulfonic acids. See under 1-naphthylamine-3:8-disulfonic acid. The 4:8-acid is also made by sulfonating 1-naphthylamine-8-sulfonic acid with three parts of 10 per cent oleum.

Literature.—Cain, Intermediate Products (2d Ed.), 200
Lange, Zwischenprodukte, #2575, 2583–2585
Thorpe, Dic. Chemistry, **3**, 594

Uses.—For making 1-amino-8-naphthol-4-sulfonic acid, 1:8-dihydroxynaphthalene-4-sulfonic acid, and 1:8-naphthasultam-2:4-disulfonic acid

1-Naphthylamine-5:7-disulfonic Acid

5-Amino-1:3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_6S_2=303$

FORMATION.—By sulfonation of the acetyl derivative of 1-naphthylamine-5-sulfonic acid or of α-naphthylamine

LITERATURE —Cain, Intermediate Products (2d Ed), 200
Lange, Zwischenprodukte, #2586
Thorpe, Dic. Chemistry, **3**, 594

USES.—For preparation of 1-amino-5-naphthol-7-sulfonic acid

2-Naphthylamine-3:6-disulfonic Acid

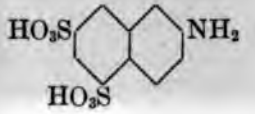
See, Amino-R Acid

2-Naphthylamine-5:7-disulfonic Acid

6-Amino-1:3-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)

β-Naphthylamine-disulfonic Acid II of Armstrong and Wynne

Armstrong and Wynne's Acid II



$= C_{10}H_9NO_6S_2 = 303$

STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

FORMATION.—By sulfonation of either 2-naphthylamine-5-sulfonic acid, or β-naphthylamine, or 2-naphthylamine-7-sulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 208
Lange, Zwischenprodukte, #2598
Thorpe, Dic. Chemistry, **3**, 605

USES.—For preparation of J acid (2-amino-5-naphthol-7-sulfonic acid)

2-Naphthylamine-6:8-disulfonic Acid

See, Amino-G Acid

α-Naphthylamine-α-disulfonic Acid

See, Freund's Acid

α-Naphthylamine-β-disulfonic Acid

1-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

α-Naphthylamine-δ-disulfonic Acid

See, 1-Naphthylamine-4: 8-disulfonic Acid

α-Naphthylamine-ε-disulfonic Acid

See, 1-Naphthylamine-3: 8-disulfonic Acid

α-Naphthylamine-disulfonic Acids D

See, 1-Naphthylamine-4: 6- *and* 4: 7-disulfonic Acids

α-Naphthylamine-disulfonic Acid S

See, 1-Naphthylamine-4: 8-disulfonic Acid

β-Naphthylamine-α-disulfonic Acid

See, Amino-R Acid

β-Naphthylamine-γ-disulfonic Acid

See, Amino-G Acid

β-Naphthylamine-δ-disulfonic Acid

2-Naphthylamine-2: 7-disulfonic Acid (*not considered herein*)

β-Naphthylamine-disulfonic Acid II of Armstrong and Wynne

See, 2-Naphthylamine-5: 7-disulfonic Acid

β-Naphthylamine-disulfonic Acid C

2-Naphthylamine-4: 8-disulfonic Acid (*not considered herein*)

β-Naphthylamine-disulfonic Acid F

2-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

β-Naphthylamine-disulfonic Acid G

See, Amino-G Acid

β-Naphthylamine-disulfonic Acid R

See, Amino-R Acid

Naphthylamine Ether

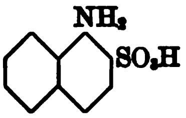
See, 1-Amino-2-naphthol Ethyl Ether

1-Naphthylamine-2-sulfonic Acid

λ Acid

o-Naphthionic Acid

1-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_3S=223$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—By heating naphthionic acid and naphthalene in a pan fitted with a stirrer and reflux condenser, at the boiling point of naphthalene (217°) for few hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 189
Thorpe, Dic. Chemistry, 3, 589
Lange, Zwischenprodukte, #2352–2355

Dye Derived from 1-Naphthylamine-2-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
562	Fast Acid Blue B	I '14:— 33,251 I '20:— 6,478	Hydrol [Oxidation]	A

1-Naphthylamine-4-sulfonic Acid

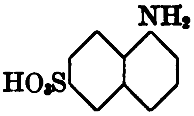
See, Naphthionic Acid

1-Naphthylamine-5-sulfonic Acid

See, Laurent's Acid

1-Naphthylamine-6-sulfonic Acid [1]

α-Naphthylamine-β-sulfonic Acid
α-Naphthylamine-β-sulfonic Acid Cl
Cleve's β Acid
Cleve's Acid
Erdmann's μ Acid *or* μ Acid
5-Amino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

Statistics.—Imported '14:—5,493 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

Formation.—From napththionic acid by heating with sulfuric acid at 120–130°

Literature.—Lange, Zwischenprodukte, 2363
Thorpe, Dic. Chemistry, 3, 591
Cf. Cain, Intermediate Products (2d Ed.), 192

Dyes Derived from 1-Naphthylamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dye			
406	Diazurine B		1-Naphthylamine-6-sulfonic Acid (2 mols) Dianisidine β-Naphthol (2 mols on fiber)	D
	Tetrakisazo Dye			
492	Anthracene Acid Brown B		1-Naphthylamine-6-sulfonic Acid (2 mols) Amino-salicylic Acid (2 mols) *m*-Phenylene-diamine	M ACr

---

[1] See 1-Naphthylamine-6- and 7-sulfonic Acids, page 400

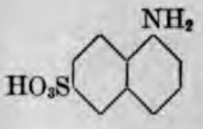
1-Naphthylamine-6- *and* 7-sulfonic Acids

Cleve's Acids

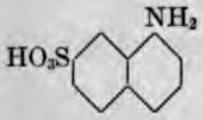
Naphthylamine-sulfonic Acids Cleve

α-Naphthylamine-sulfonic Acids Cl

5-*and* 8-Amino-2-naphthalene-sulfonic Acids (*C. A. nomen.*)



and



$=C_{10}H_9NO_3S=223$

FORMATION.—Naphthalene is sulfonated hot to β-naphthalene-sulfonic acid, this latter in sulfuric acid solution is nitrated cold with mixed acid. The excess acidity is removed with ground limestone ($CaCO_3$), and the nitro-compounds reduced with iron borings and a little acetic acid to a mixture of 1-naphthylamine-6-and-7-sulfonic acids

LITERATURE.—Cain, Intermediate Products (2d Ed.), 192
Lange, Zwischenprodukte, #2363, 2364
Thorpe, Dic. Chemistry, 3, 591

Dyes Derived from 1-Naphthylamine-6- *and* 7-sulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
242	Sulfon Black G		Aniline 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,325 M '20:— ?	Metanilic Acid Phenyl- *or* Tolyl-1-naphthylamine-8-sulfonic Acid	A

Dyes Derived from 1-Naphthylamine-6- *and* 7-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
258	Naphthalene Acid Black 4B	I '14:— 7,794	Metanilic Acid a-Naphthylamine	A
265	Sulfoncyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
277	Anthracene Acid Black	I '14:— 17,793	Amino-salicylic Acid, etc.	M
278	Biebrich Patent Black		a-Naphthylamine, etc.	A
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	*p*-Phenylene-diamine Gamma Acid *m*-Phenylene-diamine	D
458	Carbon Black		*p*-Phenylene-diamine-sulfonic Acid *from* *p*-nitro-aniline-*o*-sulfonic Acid *m*-Phenylene-(*or* Tolylene-)-diamine *or* 1:3-naphthylene-diamine-6-sulfonic Acid (2 mols)	D

1-Naphthylamine-7-sulfonic Acid

a-Naphthylamine-θ-sulfonic Acid

Cleve's θ Acid

Cleve's δ Acid

Cleve's Acid

See, 1-Naphthylamine-6- *and* 7-sulfonic Acids

1-Naphthylamine-8-sulfonic Acid

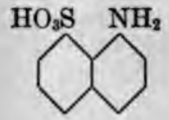
8-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

α-Naphthylamine-sulfonic Acid S

S Acid

Peri Acid

Schoellkopf's Acid



$=C_{10}H_9NO_3S=223$

Statistics.—Manufactured '19:— ?
Manufactured '20:—562,939 lbs.

Formation.—Naphthalene is sulfonated at 60° to α-naphthalene-sulfonic acid and then nitrated below 40° to 1-nitro-naphthalene-8-sulfonic acid, which latter upon reduction with iron furnishes the 1-naphthylamine-8-sulfonic acid

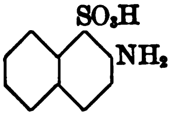
Literature.—Cain, Intermediate Products (2d Ed.), 193
Lange, Zwischenprodukte, #2365
Thorpe, Dic. Chemistry, 3, 591

Uses.—For manufacture of 1-naphthylamine-4:8-disulfonic acid

2-Naphthylamine-1-sulfonic Acid

Tobias Acid

2-Amino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_3S=223$

Statistics.—Manufactured '18:— ?
Manufactured '19:— 84,260 lbs.
Manufactured '20:—325,036 lbs.

FORMATION.—Sodium 2-naphthol-1-sulfonate (from β-naphthol and sulfuric acid at 40°) is heated with ammonium hydrogen sulfite and ammonia in an autoclave at from 100° to 150°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 205
Lange, Zwischenprodukte, #2367
Thorpe, Dic. Chemistry, 3, 601

Dyes Derived from 2-Naphthylamine-1-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
173	Lithol Red R	I '14:—281,963 M '17:— ? M '18:—353,104 M '19:—269,169 M '20:— ?	β-Naphthol	CL
179	Lake Bordeaux B		3-Hydroxy-2-naphthoic Acid	CL

2-Naphthylamine-5-sulfonic Acid

β-Naphthylamine-γ-sulfonic Acid

β-Naphthylamine-sulfonic Acid D

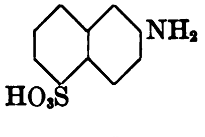
Dahl's Acid

Forsling's Acid II

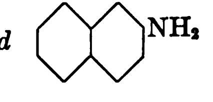
See, 2-Naphthylamine-5- *and* 8-sulfonic Acids

2-Naphthylamine-5- *and* 8-sulfonic Acids [1]

6- *and* 7-Amino-1-naphthalene-sulfonic Acids (*C. A. nomen.*)



and



$=C_{10}H_9NO_3S=223$

STATISTICS.—Imported '14:—23,265 lbs. for the 2-naphthylamine-8-sulfonic Acid

---

[1] See 2-Naphthylamine-5-sulfonic Acid and 2-Naphthylamine-8-sulfonic Acid.

FORMATION.—By sulfonation of β-naphthylamine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 205
Lange, Zwischenprodukte, #2368–2370, 2380–2383
Thorpe, Dic. Chemistry, 3, 601, 603

Dye Derived from 2-Naphthylamine-5- *and* 8-sulfonic Acids

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
175	MONOAZO DYE Ponceau for Silk	I '14:— 727	β-Naphthol	A

2-Naphthylamine-6-sulfonic Acid

See, Broenner's Acid

2-Naphthylamine-7-sulfonic Acid

β-Naphthylamine-δ-sulfonic Acid

β-Naphthylamine-sulfonic Acid F

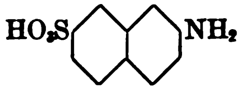
F Acid

Delta Acid

Bayer's Acid

Cassella's Acid F

7-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_3S = 223$

FORMATION.—Sodium 2-naphthol-7-sulfonic acid (from caustic soda fusion of naphthalene-2:7-disulfonic acid) is heated with ammonium acid sulfite solution and ammonia water in an autoclave at 100° to 150°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 207
Lange, Zwischenprodukte, #2377–2379
Thorpe, Dic. Chemistry, 3, 602

Dyes Derived from 2-Naphthylamine-7-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
340	Chlorazol Orange 2R		Benzidine Salicylic Acid	D
366	Diamine Red B Deltapurpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	Tolidine Broenner's Acid	D
367	Diamine Red 3B Deltapurpurin 7B		Tolidine 2-Naphthylamine-7-sul-sulfonic Acid (2 mols)	D
371	Rosazurine G		Tolidine Ethyl-2-naphthyl-amine-7-sulfonic Acid	D

2-Naphthylamine-8-sulfonic Acid

β-Naphthylamine-α-sulfonic Acid

Badische Acid

Forsling's Acid I

See, 2-Naphthylamine-5 *and* -8-sulfonic Acids

α-Naphthylamine-β-sulfonic Acid

See, 1-Naphthylamine-6-sulfonic Acid

α-Naphthylamine-δ-sulfonic Acid

See, 1-Naphthylamine-7-sulfonic Acid

Naphthylamine-sulfonic Acid Br

See, Broenner's Acid

α-Naphthylamine-β-sulfonic Acid Cl

See, 1-Naphthylamine-6-sulfonic Acid

α-Naphthylamine-sulfonic Acids Cl

See, 1-Naphthylamine-6-*and* 7-sulfonic Acids

Naphthylamine-sulfonic Acids Cleve

See, 1-Naphthylamine-6-*and* 7-sulfonic Acids

α-Naphthylamine-sulfonic Acid L

See, Laurent's Acid

α-Naphthylamine-sulfonic Acid S

See, 1-Naphthylamine-8-sulfonic Acid

β-Naphthylamine-α-sulfonic Acid

See, 2-Naphthylamine-8-sulfonic Acid

β-Naphthylamine-β-sulfonic Acid

See, Broenner's Acid

β-Naphthylamine-γ-sulfonic Acid

See, 2-Naphthylamine-5-sulfonic Acid

β-Naphthylamine-δ-sulfonic Acid

See, 2-Naphthylamine-7-sulfonic Acid

β-Naphthylamine-sulfonic Acid D

See, 2-Naphthylamine-5-sulfonic Acid

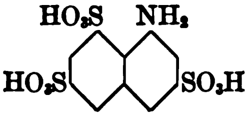
β-Naphthylamine-sulfonic Acid F

See, 2-Naphthylamine-7-sulfonic Acid

1-Naphthylamine-3:6:8-trisulfonic Acid

Koch's Acid

8-Amino-1:3:6-naphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_9S_3 = 383$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—1,418,560 lbs.
Manufactured '20:—3,921,950 lbs.

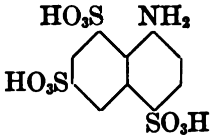
FORMATION.—Naphthalene is sulfonated to naphthalene-1:3:6-trisulfonic acid, using oleum; and this trisulfonic acid is nitrated cold, and then reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 202
Lange, Zwischenprodukte, #2747, 2748
Thorpe, Dic. Chemistry, 3, 595

USES.—For preparation of H acid (1-Amino-8-naphthol-3:6-disulfonic acid)

1-Naphthylamine-4:6:8-trisulfonic Acid

8-Amino-1:3:5-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_9S_3 = 383$

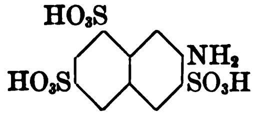
FORMATION.—Sodium naphthalene-1:5-disulfonate is sulfonated to naphthalene-1:3:5-trisulfonic acid, and this is nitrated cold, and then reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 202
Lange, Zwischenprodukte, #2750
Thorpe, Dic. Chemistry, 3, 596

USES.—For preparation of K acid (1-amino-8-naphthol-4:6-disulfonic acid)

2-Naphthylamine-3:6:8-trisulfonic Acid

7-Amino-1:3:6-*n*aphthalene-trisulfonic Acid (*C. A. nomen.*)



$= C_{10}H_9NO_9S_3 = 383$

FORMATION.—By sulfonation of amino-G acid (as potassium or sodium salt of 2-naphthylamine-6:8-disulfonic acid) with 40 per cent oleum at 80–90° and finally at 120–130°. The amino-G acid is made by amidation of G salt or by sulfonating β-naphthylamine

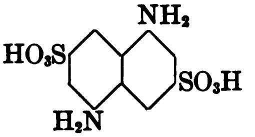
LITERATURE.—Cain, Intermediate Products (2d Ed.), 210
Lange, Zwischenprodukte, #2757
Thorpe, Dic. Chemistry, **3**, 606

USES.—For making 2R acid (2-Amino-8-naphthol-3:6-disulfonic Acid)

4-(Naphthyl-azo)-1-naphthylamine (*C. A. nomen.*)
See, o-Amino-azo-naphthalene

1-Naphthyl-diphenyl-methane (*C. A. nomen.*)
See, Diphenyl-naphthyl-methane

1:5-Naphthylene-diamine-3:7-disulfonic Acid
4:8-Diamino-2:6-naphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_6S_2 = 318$

FORMATION.—Naphthalene-2:6-disulfonic acid (from sulfonation of naphthalene) is dissolved in sulfuric acid and nitrated at 20–30°. The resulting 1:5-dinitro-naphthalene-3:7-disulfonic acid is salted out and reduced

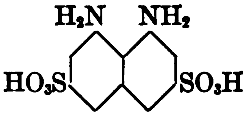
LITERATURE.—Cain, Intermediate Products (2d Ed.), 178
Lange, Zwischenprodukte, #2700
Thorpe, Dic. Chemistry, **3**, 613

Dyes Derived from 1:5-Naphthylene-diamine-3:7-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
431	Diamine Golden Yellow		Phenol (2 mols) [Ethylation]	D
432	Diamine Cutch Naphthylene Violet	I '14:— 300 I '20:— 49	α-Naphthylamine (2 mols)	D

1:8-Naphthylene-diamine-3:6-disulfonic Acid

\\
4:5-Diamino-2:7-*n*aphthalene-disulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_6S_2 = 318$

Formation.—Naphthalene-2:7-disulfonic acid (from sulfonation of naphthalene) is dissolved in strong sulfuric acid and is then dinitrated warm with strong nitric acid and sodium nitrate. The dinitro-acid is reduced

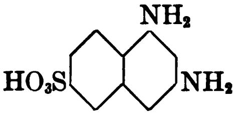
Literature.—Lange, Zwischenprodukte, #2704
Cf. Cain, Intermediate Products (2d Ed.), 178
Thorpe, Dic. Chemistry, **3**, 613

Dyes Derived from 1:8-Naphthylene-diamine-3:6-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dye			
55	Brilliant Archil C	I '14:— 401	*p*-Nitro-aniline	A

1:3-Naphthylene-diamine-6-sulfonic Acid

5:7-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_3S = 238$

Formation.—1-Naphthylamine-3:6-disulfonic acid (by nitration and reduction of naphthalene-2:7-disulfonic acid) is heated with ammonia in an autoclave at 160–180°

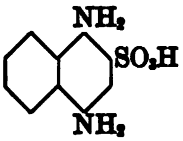
Literature.—Lange, Zwischenprodukte, #2483
Thorpe, Dic. Chemistry, **3**, 612
Cf. Cain, Intermediate Products (2d Ed.), 195

Dye Derived from 1: 3-Naphthylene-diamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
458	Carbon Black		1: 3-Naphthylene-diamine-6-sulfonic Acid (2 mols) *p*-Nitro-aniline-*o*-sulfonic Acid 1-Naphthylamine-6- *or* 7-sulfonic Acid	D

1: 4-Naphthylene-diamine-2-sulfonic Acid

1: 4-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_3S = 238$

FORMATION.—By reduction of the azo derivatives of 1-naphthylamine-2-sulfonic acid

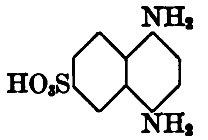
LITERATURE.—*Cf.* Thorpe, Dic. Chemistry, 3, 611, 612

Dyes Derived from 1: 4-Naphthylene-diamine-2-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
433	Coomassie Black B		R Acid *β*-Naphthylamine	A
434	Coomassie Navy Blue	I '20:— 42,357	R Acid *β*-Naphthol	A
	TRISAZO DYE			
461	Coomassie Union Black		Gamma Acid *m*-Phenylene- (*or* Tolylene-)diamine *or* Resorcinol (2 mols)	D

1:4-Naphthylene-diamine-6-sulfonic Acid

5:8-Diamino-2-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)
(*Acetyl-compound used*)



$= C_{10}H_{10}N_2O_3S = 238$

Formation.—A mixture of 1-naphthylamine-6-(*and* 7-)sulfonic acids (Cleve's Acids) is acetylated with glacial acetic acid, the excess of acetic acid distilled off, and the acetylated acids dissolved in 5 parts of sulfuric acid. These acids are nitrated with mixed acid containing 43 per cent nitric acid, cooled, diluted with ice and water, and salted out with about 2 parts of salt. The sodium 1-acetamido-4-nitro-6-(and 7-)sulfonates are now reduced hot with iron and some acetic acid. The acetyl-compound is isolated and used as such, the acetyl-group being split off after coupling

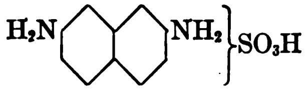
Literature.—Cain, Intermediate Products (2d Ed.), 210
Lange, Zwischenprodukte, #2486
Thorpe, Dic. Chemistry, 3, 612

Dyes Derived from 1:4-Naphthylene-diamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dye			
273	Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	α-Naphthylamine Schaeffer's Acid	D
274	Diaminogen B	I '14:—313,629 I '20:— 18,120	α-Naphthylamine Gamma Acid	D

2:7-Naphthylene-diamine-sulfonic Acid

2:7-Diamino-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)



$= C_{10}H_{10}N_2O_3S = 238$

FORMATION.—Probably by first sulfonating the 2: 7-dihydroxy-naphthalene and then by action of ammonia on the 2: 7-dihydroxy-naphthalene-sulfonic acid

LITERATURE.—Ger. Pat. 79780, 80070; Frdl. **4**, 948, 949
Cf. Thorpe, Dic. Chemistry, **3**, 610, 611, 650

Dye Derived from 2: 7-Naphthylene-diamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
330	DISAZO DYE Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Benzidine Gamma acid	D

o-Naphthylene-diamine-β-sulfonic Acid

1: 2-Naphthylene-diamine-6-sulfonic Acid (*not considered herein*)

o-Napthylene-diamine-γ-sulfonic Acid

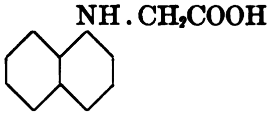
1: 2-Naphthylene-diamine-5-sulfonic Acid (*not considered herein*)

o-Naphthylene-diamine-δ-sulfonic Acid

1: 2-Naphthylene-diamine-7-sulfonic Acid (*not considered herein*)

α-Naphthyl-glycine

N-(1-Naphthyl)-*g*lycine (*C. A. nomen.*)



$= C_{12}H_{11}NO_2 = 201$

FORMATION.—From α-naphthylamine by reaction with chloro-acetic acid

LITERATURE.—Lange, Zwischenprodukte, #2264
Ger. Pat. 79861 of 1893

Dyes Derived from α-Naphthyl-glycine

Schults Numbe for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
309	Glycine Red		Benzidine Naphthionic Acid	D
310	Glycine Corinth		Benzidene α-Naphthyl-glycine (2 mols)	D

β-Naphthyl-sulfuric Acid

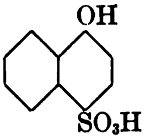
See, 2-Naphthol-1-sulfonic Acid

Nevile-Winther's Acid

1-Naphthol-4-sulfonic Acid (*C. A. nomen.*)

NW Acid

α-Naphthol-sulfonic Acid NW



$= C_{10}H_8O_4S = 224$

STATISTICS.—Manufactured '18:—340,074 lbs.
Manufactured '19:—344,449 lbs.
Manufactured '20:—561,929 lbs.

FORMATION.—From the sodium salt of naphthionic acid by hydrolyzing the amino group

LITERATURE.—Cain, Intermediate Products (2d Ed.), 217
Thorpe, Dic. Chemistry, **3**, 617
Lange, Zwischenprodukte, #2415–2421

Dyes Derived from Nevile-Winther's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
77	Azo Coccine 2R		Xylidine	A
94	Azo Eosine	I '14:— 1,001 M '18:— ? M '19:— ?	*o*-Anisidine	A
104	Benzoyl Pink		Benzoyl-*o*-tolidine	D
163	Azo Rubine	I '14:—230,763 M '17:—197,621 M '18:— 79,779 M '19:—187,264 I '20:— 1,102 M '20:—470,949	Naphthionic Acid	A
176	Double Scarlet S Scarlet 2R	I '14:— 10,182 M '17:— ? I '20:— 1,653	Broenner's Acid	A
194	Rosophenine 10B Thiazine Red R	I' 14:— 3,077 M '19:— ? M '20:— ?	Dehydrothio-*p*-toluidine-sulfonic Acid	D
195	Rosophenine SG	M '18:— ? M '19:— ? M '20:— 19,639	Primuline	D
	DISAZO DYES			
224	Cloth Red G	I '14:— 401 M '19:— ? M '20:— ?	Amino-azo-benzene	A
233	Cloth Red B	I '14:— 1,962 M '18:— ? M '19:— ? M '20:— ?	Amino-azo-toluene	M
253	Orseilline BB		Amino-azo-toluene-sulfonic Acid	A

Dyes Derived from Nevile Winther's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	*a*-Naphthylamine Amino-salicylic Acid	ACr
290	Violet Black		*a*-Naphthylamine *p*-Phenylene-diamine *or* Amino-acetanilide	D
291	Azo Alizarin Bordeaux W		Salicylic Acid *p*-Phenylene-diamine	M
312	Congo Corinth	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Benzidine Naphthionic Acid	D
355	Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	*o*-Nitro-benzidine Salicylic Acid	ACr
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Tolidine Naphthionic Acid	D
377	Azo Blue	I '14:— 498 M '19:— ? M '20:— ?	Tolidine Nevile-Winther's Acid (2 mols)	D
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Tolidine Chromotropic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	Tolidine J Acid	D

Dyes Derived from Nevile-Winther's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Tolidine H Acid	D
396	Indazurine RM		Tolidine 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
397	Direct Blue R	M '17:— ?	Tolidine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
401	Diamine Blue 3R		Ethoxy-benzidine Nevile-Winther's Acid (2 mols)	D
407	Azo Violet		Dianisidine Naphthionic Acid	D
410	Benzoazurine G	I '14:— 78,699 M '18:— ? M '19:—150,589 I '20:— 287 M '20:—237,328	Dianisidine Nevile-Winther's Acid (2 mols)	D
412	Congo Blue 2B		Dianisidine R Acid	D
421	Oxamine Blue B	I '14:— 35,891 I '20:— 13	Dianisidine 1-Amino-5-naphthol-7-sulfonic Acid	D
427	Indazurine GM		Dianisidine 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	Dianisidine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D

Dyes Derived from Nevile-Winther's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
447	Benzo Gray S	I '14:— 802	Benzidine Salicylic Acid α-Naphthylamine	D
450	Benzo Black Blue R		Tolidine α-Naphthylamine Nevile-Winther's Acid (2 mols)	D
459	Benzo Black Blue G		Benzidine-disulfonic Acid α-Naphthylamine Nevile-Winther's Acid (2 mols)	D
483	St. Denis Red Rosophenine 4B	I '14:— 1,496 I '20:— 550	Diamino-azoxy-toluene Nevile-Winther's Acid (2 mols)	D
484	Milling Scarlet B		Diamino-azoxy-toluene R Acid	A

Nigrotic Acid

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

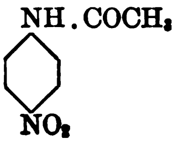
Nigrotinic Acid

See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid

Nitro-1:2:4 Acid

See, 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

***p*-Nitro-acetanilide**



$= C_8H_8N_2O_3 = 180$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—541,552 lbs.
Manufactured '19:—669,658 lbs.
Manufactured '20:—569,728 lbs.

FORMATION.—Aniline is acetylated to acetanilide, which is dissolved in sulfuric acid and then nitrated with mixed acid in the cold

LITERATURE.—Cain, Intermediate Products (2d Ed.), 53

USES.—For the manufacture of *p*-nitro-aniline and acetyl-*p*-phenylene-diamine (*p*-amino-acetanilide)

Nitro-alizarin, *crude*

$C_{14}H_7NO_6 = 285$

FORMATION.—Alizarin is dissolved in sulfuric acid and nitrated

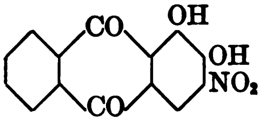
Dye Derived from Nitro-alizarin, *crude*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
798	Alizarin Maroon W	I '20:— 2,014	[Reduction]	M

3-Nitro-alizarin (*C. A. nomen.*)

β-Nitro-alizarin

1:2-Dihydroxy-3-nitro-anthraquinone



$= C_{14}H_7NO_6 = 285$

STATISTICS.—Refer to the dye, Alizarin Orange, which is 3-nitro-alizarin

FORMATION.—From alizarin by nitration of its boric ester

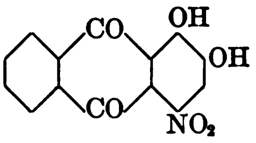
LITERATURE.—Schultz, Farbstofftabellen (1914), #779
Lange, Zwischenprodukte, #3341
Georgievics and Grandmougin, Dye Chemistry, 268

Dyes Derived from 3-Nitro-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
779	Alizarin Orange	I '14:— 14,239 M '19:— ? I '20:— 500 M '20:— ?	[This is 3-nitro-alizarin]	M
803	Alizarin Blue WX	I '14:—319,394 M '19:— ? I '20:— 5,585	3-Amino-alizarin [Glycerol]	M
804	Alizarin Blue S	I '14:—117,850 I '20:— 43,679	3-Amino-alizarin [Glycerol]	M
808	Alizarin Green X	I '14:—135,191 I '20:— 4,254	3-Amino-alizarin [Glycerol; Oxidation]	M
809	Alizarin Indigo Blue S		3-Amino-alizarin [Glycerol; Oxidation]	M

4-Nitro-alizarin (*C. A. nomen.*)

α-Nitro-alizarin



$=C_{14}H_7NO_6=285$

FORMATION.—This compound is made by nitration of alizarin in weak oleum solution, or by nitration of the methyl, benzoyl, or arsenic ester of alizarin

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 268
Schultz, Farbstofftabellen (1914), #779

Dyes Derived from 4-Nitro-alizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
797	Alizarin Garnet R	I '14:— 720	[Reduction]	M
805	Alizarin Green S	I '14:— 15,885	Nitro-benzene [Reduction; Glycerol]	M

α-Nitro-alizarin
See, 4-Nitro-alizarin

β-Nitro-alizarin
See, 3-Nitro-alizarin

6-Nitro-*m*-amino-benzene-sulfonic Acid
See, 6-Nitro-metanilic Acid (*C. A. nomen.*)

o-Nitro-o-amino-p-cresol
See, 2-Amino-6-nitro-*p*-cresol (*C. A. nomen. OH* = *1*)

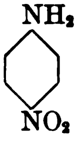
FORMATION.—Benzene is nitrated with mixed acid to dinitro-benzene, and this body is reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 51
Lange, Zwischenprodukte, #537, 542

Dyes Derived from *m*-Nitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
46	*m*-Nitraniline Orange		β-Naphthol	MF
47	Orange III	M '18:— ?	R Acid	A
48	Alizarin Yellow GG	I '14:—144,761 M '17:— 1,452,622 M '18:— 2,233,208 M '19:—163,170 M '20:—211,580	Salicylic Acid	M
49	Prague Alizarin Yellow G		β-Resorcylic Acid	M
	DISAZO DYES			
222	Janus Yellow G	I '14:— 2,250 I '20:— 758	Resorcinol *m*-Amino-phenyl-tri-methyl-ammonium Chloride	B
408	Azophor Black S		*m*-Nitro-aniline (? mols) Dianisidine	D

***p*-Nitro-aniline**



$= C_6H_6N_2O_2 = 138$

STATISTICS.—Imported '14:— 771,682 lbs.
Manufactured '17:—1,724,008 lbs.
Manufactured '18:—1,320,064 lbs.
Manufactured '19:—1,310,658 lbs.
Manufactured '20:—2,138,492 lbs.

FORMATION.—(1) Aniline is acetylated to acetanilide, which is then nitrated with mixed acid to *p*-nitro-acetanilide. The latter compound is hydrolyzed by boiling with caustic soda to *p*-nitro-aniline. (2) *p*-Chloro-nitro-benzene is heated with ammonia under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 51
Lange, Zwischenprodukte, #533, 538–541

Dyes Derived from *p*-Nitro-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
50	Azo Cardinal G	M '18:— ?	Ethyl-sulfobenzyl-aniline	A
51	Nitrophenine Thiazol Yellow R	I '14:— 423 M '20:— ?	Dehydrothio-toluidine-sulfonic Acid	D
52	Archil Substitute V		Naphthionic Acid	A
53	Archil Substitute 3VN		Laurent's Acid	A
54	Apollo Red B	I '14:— 904	1-Naphthylamine-4:6- *and* -4:7-disulfonic Acids	A
55	Brilliant Archil C	I '14:— 401 I '20:— 100	1:8-Naphthylene-diamine-3:6-disulfonic Acid	A
56	Paranitraniline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	MF

Dyes Derived from *p*-Nitro-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
57	Chromotrope 2B	I '14:— 7,970 M '18:— ? M '19:— ? M '20:— ?	Chromotropic Acid	ACr
58	Alizarin Yellow R	I '14:— 97,059 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	Salicylic Acid	M
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,182 M '20:— ?	Chromotropic Acid [Reduction]	A
63	Azo Acid Blue B	I '14:— 45,098 I '20:— 4,485	1:8-Dihydroxy-naphthalene-4-sulfonic Acid [Methylation]	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	Aniline 1-Amino-8-naphthol-4:6-disulfonic Acid	A
216	Domingo Blue Black B		Aniline 1-Amino-8-naphthol-3:5-disulfonic Acid	A
217	Naphthol Blue Black Agalma Black 10B	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 840 M '20:— 2,608,864	Aniline H Acid	A

Dyes Derived from *p*-Nitro-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
218	Nigrophor B A S F		2: 5-Dichloro-aniline 1-Amino-8-naphthol-5-sulfonic Acid	MF
221	Anthracene Acid Brown G	M '17:— ? M '18:— ? I '20:— 225	Sulfanilic Acid Salicylic Acid	ACr
245	Nyanza Black B		α-Naphthylamine Gamma Acid [*p*-Nitro-aniline reduced after coupling]	D
408	Azophor Blue D Azophor Black S		Dianisidine	D
	TRISAZO DYES			
473	Diamine Black HW	I '20:— 342	Benzidine Gamma Acid H Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine Phenol H Acid	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:—136,638 I '20:— 1,332 M '20:— 53,292	Benzidine Salicylic Acid H Acid	D
	SULFUR DYE			
719	Thional Black	I '14:— 16,865	*o*-Nitro-phenol [Na_2S plus S] *or* *o*-Nitro-phenol (2 mols) Aniline [Na_2S plus S]	S

2-Nitro-aniline-4-sulfonic Acid ($NH_2=1$)

See, 4-Amino-3-nitro-benzene-sulfonic Acid (*C. A. nomen.*)

4-Nitro-aniline-2-sulfonic Acid ($NH_2=1$)

See, 2-Amino-5-nitro-benzene-sulfonic Acid (*C. A. nomen.* $SO_3H=1$)

4-Nitro-aniline-3-sulfonic Acid

See, 6-Nitro-metanilic Acid (*C. A. nomen.*)

o-Nitro-aniline-p-sulfonic Acid ($NH_2=1$)

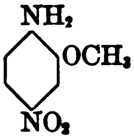
See, 4-Amino-3-nitro-benzene-sulfonic Acid (*C. A. nomen.*)

p-Nitro-aniline-o-sulfonic Acid ($NH_2=1$)

See, 2-Amino-5-nitro-benzene-sulfonic Acid (*C. A. nomen* $SO_3H=1$)

4-Nitro-o-anisidine (*C. A. nomen.* $NH_2=1$)

p-Nitro-*o*-anisidine ($NH_2=1$)



$=C_7H_8N_2O_3=168$

FORMATION.—*o*-Anisidine is acetylated, then nitrated, and saponified by heating with 70 per cent sulfuric acid. The resulting mixture of 4- *and* 5-nitro-*o*-anisidines, is separated by crystallization from 40 per cent sulfuric acid

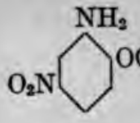
LITERATURE.—Lange, Zwischenprodukte, #911

Dye Derived from 4-Nitro-o-anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
98	Naphthol Pink Nitrosamine Pink BX	I '14:— 99	β-Naphthol	MF

5-Nitro-*o*-anisidine (*C. A. nomen.* $NH_2=1$)

m-Nitro-*o*-anisidine ($NH_2=1$)



$=C_7H_8N_2O_3=168$

FORMATION.—*o*-Anisidine is acetylated, then nitrated, and saponified by heating with 70 per cent sulfuric acid. The resulting mixture of 4- and 5-nitro-*o*-anisidines is separated by crystallization from 40 per cent sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #911

Dye Derived from 5-Nitro-*o*-anisidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
99	MONOAZO DYE Tuscaline Orange G		β-Naphthol	CL MF

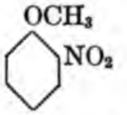
***m*-Nitro-*o*-anisidine** ($NH_2=1$)

See, 5-Nitro-*o*-anisidine (*C. A. nomen.* $NH_2=1$)

***p*-Nitro-*o*-anisidine** ($NH_2=1$)

See, 4-Nitro-*o*-anisidine (*C. A. nomen.* $NH_2=1$)

***o*-Nitro-anisole**



$=C_7H_7NO_3=153$

STATISTICS.—Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:—273,327 lbs.

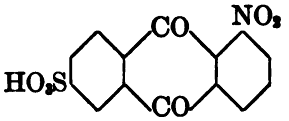
FORMATION.—(1) From *o*-nitro-phenol by methylation. (2) From *o*-chloro-nitro-benzene by action of methanol (methyl alcohol) and caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96
Cf. Lange, Zwischenprodukte, #578

USES.—For preparation of dianisidine

1-Nitro-anthraquinone-6-sulfonic Acid

5-Nitro-2-anthraquinone-sulfonic Acid (*C. A. nomen.*)



$=C_{14}H_7NO_7S=333$

FORMATION.—When anthraquinone-2-sulfonate of sodium is nitrated with a mixture of equal parts of "fuming" nitric acid and sulfuric acid (66°) there arises a mixture of the α-nitro and β-nitro-anthraquinone-sulfonic acid which can be separated by dilution, whereupon the α-acid is precipitated. The α-acid is undoubtedly 1-nitro-anthraquinone-6-sulfonic acid

LITERATURE.—Claus, Ber. **15**, 1515 (1882)
Cf. Lange, Zwischenprodukte, #3160, 3263

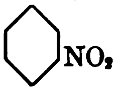
Dye Derived from 1-Nitro-anthraquinone-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	Aniline [Halogenation] *p*-Toluidine	ACr

5-Nitro-2-anthraquinone-sulfonic Acid (*C. A. nomen.*)

See, 1-Nitro-anthraquinone-6-sulfonic Acid

m-Nitro-*b*enzaldehyde



$=C_7H_5NO_3=151$

STATISTICS.—Imported '14:—very small
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '20:— ?

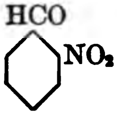
FORMATION.—From benzaldehyde by nitration at not above 30–35°. (Twenty per cent *o*-nitro-derivative also formed)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 144
Lange, Zwischenprodukte, #296

Dyes Derived from *m*-Nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
510	Azo Green		Dimethyl-aniline (2 mols) Salicylic Acid [Oxidation]	M
523	Fast Green	I '14:— 14,347 I '20:— 10,461	Dimethyl-aniline (2 mols) Benzyl Chloride (2 mols) [Sulfonation, Oxidation]	A
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
545	Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) [Sulfonation, Oxidation]	A

***o*-Nitro-benzaldehyde**



$= C_7H_5NO_3 = 151$

STATISTICS.—Manufactured '18:— ?

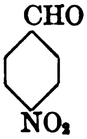
FORMATION.—When benzaldehyde is nitrated, there results about 20 per cent of the *o*-nitro- and about 80 per cent of the *m*-nitro-derivative. The nitration product is poured into water, and the oily *o*-derivative is separated from the solid *m*-compound by pressing

LITERATURE.—Cain, Intermediate Products (2d Ed.), 143
Lange, Zwischenprodukte, 22, 37, 38, 40, 181, 254, 275, 278, 289–302

Dye Derived from *o*-Nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
875	INDIGO GROUP DYE Indigo Salt T		[Acetone; NaOH]	Printing

p-Nitro-benzaldehyde



$=C_7H_5NO_3=151$

STATISTICS.—Imported '14:—very small

FORMATION.—From *p*-nitro-toluene by oxidation

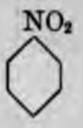
LITERATURE.—Lange, Zwischenprodukte, #275, 303–312

Dye Derived from *p*-Nitro-benzaldehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
511	TRIPHENYL-METHANE DYE Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (Sulfate) (2 mols) [Zinc chloride; ferrous chloride]	B

Nitro-benzene

Myrbane Oil



$= C_6H_5NO_2 = 123$

STATISTICS.—Imported '14:— 1,502,205 lbs.
Manufactured '17:—42,975,655 lbs.
Manufactured '18:—38,250,332 lbs.
Manufactured '19:—42,544,017 lbs.
Manufactured '20:—53,244,008 lbs.

FORMATION.—From benzene by nitration with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 20
Lange, Zwischenprodukte, #264–268

Dyes Derived from Nitro-benzene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (2 mols) *p*-Toluidine *or* *p*:*p*′-Diamino-diphenyl-methane *or* Anhydro-formaldehyde-aniline Aniline and aniline hydrochloride [Ferric chloride]	B
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	Aniline *o*-Toluidine *p*-Toluidine [Iron and zinc chloride]	B

Dyes Derived from Nitro-benzene (*continued*)

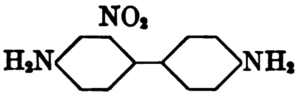
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
698	Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—302,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess) [Iron]	ss
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:— 1,968,458 M '18:— 1,191,343 M '19:— 1,660,149 I '20:— 501 M '20:— 2,743,021	Aniline (excess) [Iron, Sulfonation]	A
	SULFUR DYE			
718	St. Denis Black		*p*-Phenylene-diamine Phenol [S_2Cl_2, S, Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
805	Alizarin Green S	I '14:— 15,885	4-Amino-alizarin [Reduction; glycerol]	M

3-Nitro-benzidine (*C. A. nomen.* $NH_2 = 1$)

See, *o*-Nitro-*b*enzidine

o-Nitro-benzidine

3-Nitro-*b*enzidine (*C. A. nomen.* $NH_2 = 1$)



$= C_{12}H_{11}N_3O_2 = 229$

STATISTICS.—Manufactured '19:— ?

FORMATION.—By nitration of benzidine in sulfuric acid solution

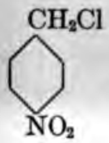
Literature.—Green, Organic Coloring Matters (1908), 41
Eng. Pat. 13475 of 1892
Lange, Zwischenprodukte, #1220

Dye Derived from *o*-Nitro-benzidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
355	Disazo Dye Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	Salicylic Acid Nevilé-Winther's Acid	ACr

p-Nitro-benzyl Chloride

a-Chloro-*p*-nitro-*to*luene (*C. A. nomen.*)



$=C_7H_6ClNO_2=171.5$

Formation.—(1) By passing chlorine into *p*-nitro-toluene heated to 185–190°. (2) By dropping benzyl chloride into fuming nitric acid cooled to −15° C.

Literature.—Ann. **185**, 271
Ber. **6**, 1056
Cf. Lange, Zwischenprodukte, #250

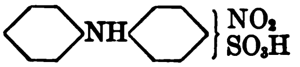
Dye Derived from *p*-Nitro-benzyl Chloride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
734	Sulfur Dye Pyrogene Yellow	I '14:— 18,515 I '20:— 2,701	*p*-Amino-phenol [S+Na_2S]	S

o- and p-Nitro-chloro-benzenes

See, o- and p-Chloro-nitro-benzenes (*C. A. nomen.*)

Nitro-diphenylamine-sulfonic Acid



$=C_{12}H_{10}N_2O_5S=294$ (?)

Formation.—Diphenylamine in sulfuric acid solution is heated with 20 per cent oleum at 80–100°, and is then nitrated with nitric acid at 50–80°, resulting in formation of "nitrated diphenylamine-sulfonic acid"

Literature.—Lange, Die Schwefel-farbstoffe, 145

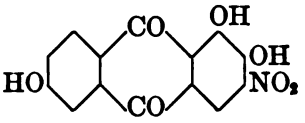
Dye Derived from Nitro-diphenylamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
737	Sulfur Dye Cotton Brown Sulfine Brown	I '14:— 2,206	[S+Na_2S]	S

3-Nitro-flavopurpurin (*C. A. nomen.*)

β-Nitro-flavopurpurin

3-Nitro-1:2:6-trihydroxy-anthraquinone



$=C_{14}H_7NO_7=301$

Formation.—By nitration of flavopurpurin

Literature.—Ger. Pat. 54,624, Frdl. **2**, 122

Dyes Derived from 3-Nitro-flavopurpurin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
806	Alizarin Black P	I '14:—229,500	[Glycerol]	M
807	Alizarin Black S	I '14:—259,991	[Glycerol]	M

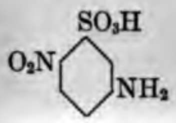
β-Nitro-flavopurpurin

See, 3-Nitro-flavopurpurin

6-Nitro-*metanilic* Acid (*C. A. nomen.*)

4-Nitro-aniline-3-sulfonic Acid

6-Nitro-*m*-amino-benzene-sulfonic Acid



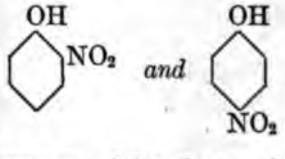
$=C_6H_6N_2O_5S=218$

FORMATION.—Sodium metanilate is acetylated, dissolved in sulfuric acid and nitrated with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 56

USES.—For preparation of nitro-*m*-phenylene-diamine

Nitro-phenol *crude*



$=C_6H_5NO_3=139$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?

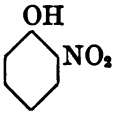
FORMATION.—From phenol by nitration with nitric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111

Dyes Derived from Nitro-phenol *crude*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
698	Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—362,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess)	ss
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:—1,968,458 M '18:—1,191,343 M '19:—1,660,149 I '20:— 501 M '20:—2,743,021	Aniline (excess) [Sulfonation]	A

o-Nitro-*p*henol



= $C_6H_5NO_3$ = 139

STATISTICS.—Imported '14:—very small
Manufactured '17:— 58,128 lbs.
Manufactured '18:—143,277 lbs.
Manufactured '19:— 18,373 lbs.
Manufactured '20:— ?

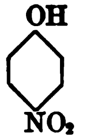
FORMATION.—(1) Phenol is nitrated with nitric acid, resulting in an oily mixture of *o*- and *p*-nitro-phenol. The *o*-derivative is separated by distillation and purified by steam distillation. (2) *o*-Chloro-nitro-benzene is hydrolyzed to the *o*-nitro-phenol by boiling with caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111
Lange, Zwischenprodukte, #574–577

Dye Derived from *o*-Nitro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
719	SULFUR DYE Thional Black	I '14:— 16,865	*p*-(*o*- *or* *m*-)Nitro-aniline [Na_2S+S] *or* *p*-(*o*- *or* *m*-)Nitro-aniline Aniline *o*-Nitro-phenol (2 mols) [Na_2S+S]	S

p-Nitro-*p*henol



$=C_6H_5NO_3=139$

STATISTICS.—Imported '14:— 4,780 lbs.
Manufactured '17:—413,216 lbs.
Manufactured '18:—192,259 lbs.
Manufactured '19·— 76,191 lbs.
Manufactured '20·—125,693 lbs.

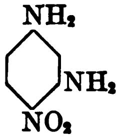
FORMATION.—(1) Phenol is nitrated with nitric acid to an oily mixture of *o*- and *p*-nitro phenol, from which the *o*-isomer is removed by distillation. The residue upon being extracted with hot water yields the *p*-isomer, which crystallizes out from the aqueous extract upon cooling. (2) *p*-Chloro-nitro-benzene is hydrolyzed to the *p*-nitro-phenol by boiling with caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111
Lange, Zwischenprodukte, ♯574–576

Dye Derived from *p*-Nitro-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
709	Italian Green		[Sulfur, etc.]	S

4-Nitro-*m*-phenylene-diamine



$= C_6H_7N_3O_2 = 153$

FORMATION.—5-Amino-2-nitro-benzene-sulfonic Acid (4-nitro-aniline-3-sulfonic acid) is heated in an autoclave with 25 per cent ammonia water for three hours at 170–180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 86

Dyes Derived from 4-Nitro-*m*-phenylene-diamine

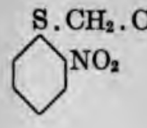
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
191	Pyramine Yellow R	I '14:— 5,727 I '20:— 100	Primuline-sulfonic Acid	D
	DISAZO DYES			
286	Toluylene Yellow	I '14:— 5,485	3:5-Diamino-*p*-toluene-sulfonic Acid Nitro-*m*-phenylene-diamine (2 mols)	D
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Benzidine *m*-Phenylene-diamine-disulfonic Acid	D
314	Pyramine Orange 2R	I '14:— 2,789	Benzidine Amino-R Acid	D
360	Pyramine Orange R	I '14:— 21,329 I '20:— 7,821	Benzidine-disulfonic Acid Nitro-*m*-phenylene-diamine (2 mols)	D

(*o*-Nitro-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)

See, *o*-Nitro-phenyl-thioglycolic Acid

_o_-Nitro-phenyl-thioglycolic Acid

(*o*-Nitro-phenyl-mercapto)-*a*cetic Acid (*C. A. nomen.*)



$=C_8H_7NO_4S=213$

FORMATION.—*o*-Chloro-nitro-benzene in hot alcoholic solution is treated with thioglycolic acid and caustic soda solution, and then boiled for two hours under a reflux condenser

LITERATURE.—Lange, Zwischenprodukte, #611

Dye Derived from *o*-Nitro-phenyl-thioglycolic Acid

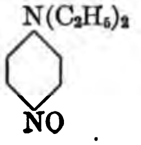
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
921	Helindone Gray 2B		*o*-Nitro-phenyl-thioglycolic Acid (2 mols) [Chloro-sulfonic Acid; Reduction]	V

Nitroso-diethyl-*m*-amino-phenol

See, 5-Diethylamino-2-nitroso-phenol (*C. A. nomen.*)

_p_-Nitroso-diethyl-aniline

N: *N*-Diethyl-*p*-nitroso-*a*niline (*C. A. nomen.*)



$=C_{10}H_{14}N_2O=178$

STATISTICS.—Imported '14:—very small

FORMATION.—From diethyl-aniline by action of nitrous acid

LITERATURE.—Lange, Zwischenprodukte, #531

Dyes Derived from *p*-Nitroso-diethyl-aniline

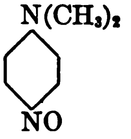
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES			
639	Gallanilic Violet R, B	I '20:— 100	Gallanilide	M
641	Coreine RR Coelestine Blue B	I '14:— 1,320 I '20:— 44	Gallamide	M
646	Coreine AR		Gallamide Aniline [Sulfonation] *or* [Coreine RR, Aniline, Sulfonation]	M

Nitroso-dimethyl-*m*-amino-*p*-cresol

See, 5-Dimethylamino-2-nitroso-*p*-cresol (*C. A. nomen.*)

_p_-Nitroso-dimethyl-aniline

N: *N*-Dimethyl-*p*-nitroso-aniline (*C. A. nomen.*)



$= C_8H_{10}N_2O = 150$

STATISTICS.—Manufactured '17:— 96,166 lbs.
Manufactured '18:—851,821 lbs.
Manufactured '19:—592,663 lbs.
Manufactured '20:—155,986 lbs.

FORMATION.—From dimethyl-aniline by action of nitrous acid upon a cold solution of the hydrochloride

LITERATURE.—Lange, Zwischenprodukte, #531

Dyes Derived from *p*-Nitroso-dimethyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDOPHENOL			
619	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	α-Naphthol	V
	OXAZINE AND THIAZINE DYES			
620	Capri Blue G O N	I '14:— 128	3-Diethylamino-*p*-cresol (*OH* = *1*)	B
622	Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 M '20:— 76,719 I '20:— 29,643	Gallic Acid Aniline [Sulfonation] *or* [Aniline on Gallocyanine, Sulfonation]	M
623	Pyrogallol-Cyanine-Sulfonic Acids		Pyrogallol-5-sulfonic Acid	M
624	Modern Violet N	I '20:— 5,688	Gallic Acid [CO_2 removed by heat] *or* [Gallocyanine heated]	M
626	Gallocyanine	I '14:— 78,253 M '17:— ? M '18:—435,460 M '19:—365,243 I '20:— 12,414 M '20:— 70,169	Gallic Acid	M
627	Modern Cyanine		Gallamide Dimethyl-*p*-phenylene-diamine [Reduction] *or* [Gallocyanine; Dimethyl-*p*-phenylene-diamine; Reduction]	M

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediate Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
628	Gallocyanine MS		Gallic Acid [Sulfonation] *or* [Leuco-gallocyanine sulfonated; oxidized]	M
629	Gallogreen DH Modern Blue		Gallic Acid [Formaldehyde] *or* [Formaldehyde on Gallocyanine]	M
630	Cyanazurine		Gallamide Aniline [Reduction]	M
631	Chromocyanine V	M '18:— ? M '19:— ? I '20:— 1,289 M '20:— ?	Gallic Acid [Sulfonation] *or* [Sulfite on Gallocyanine]	M
632	Ultraviolet LGP	I '14:— 4,368	Gallic Acid (2 mols) Nitroso-dimethyl-aniline (2 mols)	M
633	Indalizarine R	I '20:— 551	Gallic Acid [Sulfonation]	M
634	Indalizarine Green		Gallic Acid [Sulfonation; Nitration] *or* [Nitration of Indalizarine]	M
635	Blue 1900 TC Modern Violet	I '20:— 1,933	Gallic Acid [Reduction]	M
636	Prune	I '14:— 3,197 I '20:— 4,418	Gallic Acid Methyl Ester	M

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
637	Gallamine Blue	I '14:— 2,756 I '20:— 16,446	Gallamide	M
638	Amido Gallamine Blue		Gallamide [Ammonia; Reduction]	M
639	Gallanilic Violet R, B	I '20:— 100	Gallanilide	M
640	Modern Azurine DH		Gallic Acid Methyl Ester Aniline	M
642	Phenocyanine TC	I '20:— 4,740	Gallic Acid Resorcinol	M
643	Phenocyanine TV	M '17:— ? I '20:— 1,543	Gallic Acid Resorcinol [Sulfonation] *or* [Phenocyanine sulfonated]	M
644	Ultracyanine B		Gallic Acid Resorcinol *or* [Gallocyanine; Resorcinol]	M
645	Gallazine A		Gallic Acid Schaeffer's Acid [Oxidation] *or* [Gallocyanine, Schaeffer's, Oxidation]	M
647	Nitroso Blue MR Resorcine Blue		Resorcinol	MF

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
649	New Blue R Meldola's Blue Cotton Blue	I '14:— 32,509 M '17:— ? M '18:— 22,613 M '19:— ? I '20:— 5,240 M '20:— ?	β-Naphthol	B
650	New Blue B		β-Naphthol Nitroso-dimethyl-aniline (2 mols)	B
651	New Methylene Blue GG		β-Naphthol [Dimethyl-amine, Oxidation] *or* [Meldola's Blue, Dimethyl-amine, Oxidation]	B
652	New Fast Blue F	I '14:— 2,502	β-Naphthol Hydrol *or* [Meldola's Blue, Hydrol]	B
655	Muscarine		2: 7-Dihydroxy-naphthalene	B
658	Fast Black	I '14:— 1,960 I '20:— 2,883	*m*-Hydroxy-diphenyl-amine	B
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline [$Na_2S_2O_3$, etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,047	Dimethyl-aniline [$Na_2S_2O_3$ etc.; Nitration] *or* [Methylene Blue nitrated]	B

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

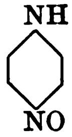
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE AND THIAZINE DYES (*continued*)			
661	Thionine Blue GO	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline [$Na_2S_2O_3$, etc.]	B
	AZINE DYES			
670	Neutral Red	M '18:— ?	*m*-Tolylene-diamine [Oxidation]	B
676	Neutral Blue	I '14:— 615	*N*-Phenyl-*β*-naphthylamine	B
677	Basle Blue R		*N*: *N'*-Ditolyl-2: 7-naphthylene-diamine	B
678	Fast Neutral Violet B	M '17:— ?	*N*: *N'*-Diethyl-*m*-phenylene-diamine	B
681	Methylene Gray O New Fast Gray	I '14:— 29,507 M '17:— ? M '18:— 16,746 M '19:— 28,458 I '20:— 9 M '20:— 31,620	[Boiling with alcohol]	B
682	Nigramine		Aniline	B
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	N^1-Phenyl-4-*m*-tolylene-diamine *or* N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine	B
685	Tannin Heliotrope	I '14:— 1,398 I '20:— 249	Xylidine	B
689	Indazine M		Nitroso-dimethyl-aniline (1 and 2 mols) Diphenyl-*m*-phenylene-diamine	B

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES (*continued*)			
691	Metaphenylene Blue B	I '14:— 50	*N*: *N'*-Di-*o*-tolyl-*m*-phenylene-diamine	B
692	Naphthazine Blue	I '14:— 6,261 I '20:— 2,249	*N*:*N'*-Di-2-naphthyl-*m*-phenylene-diamine [Sulfonation]	A
703	Rubramine		*o*-Toluidine *p*-Toluidine	B
704	Indamine 3R		*o*-Toluidine	B
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	*o*-Toluidine *p*-Toluidine	B

p-Nitroso-ethyl-aniline

N-Ethyl-*p*-nitroso-aniline (*C. A. nomen.*)



$= C_8H_{10}N_2O = 150$

FORMATION.—From ethyl-aniline by action of nitrous acid on the solution in strong alcoholic hydrochloric acid

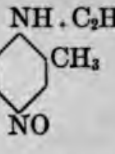
LITERATURE.—*Cf.* Lange, Zwischenprodukte, #529

Dye Derived from *p*-Nitroso-ethyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
684	Rhoduline Red B		N^1-Phenyl-4-*m*-tolylene-diamine *or* N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine	B

p-Nitroso-ethyl-o-toluidine

N-Ethyl-4-nitroso-o-toluidine (*C. A. nomen. NHR=1*)



$= C_9H_{12}N_2O = 164$

Formation.—From ethyl-o-toluidine in an alcoholic solution of hydrochloric acid, by action of $NaNO_2$ solution in the cold

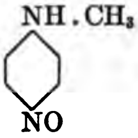
Literature.—Beilstein, Organische Chemie (3d aufl.), II, spl., 248
Cf. Lange, Zwischenprodukte, #529

Dyes Derived from Nitroso-ethyl-o-toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
684	Rhoduline Red G		N^1-Phenyl-4-m-tolylene-diamine *or* N^3-Benzyl-N^1-phenyl-4-m-tolylene-diamine	B
684	Brilliant Rhoduline Red		N^3-Ethyl-N^1-phenyl-4-m-tolylene-diamine	B

p-Nitroso-methyl-aniline

N-Methyl-p-nitroso-aniline (*C. A. nomen.*)



$= C_7H_8N_2O = 136$

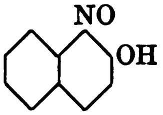
Formation.—From methyl-aniline by action of nitrous acid on the solution in strong alcoholic hydrochloric acid

Literature.—Lange, Zwischenprodukte, #529

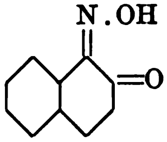
Dye Derived from *p*-Nitroso-methyl-aniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
625	Chrome Heliotrope		Gallic Acid [Reduction]	M

1-Nitroso-2-*naphthol* (*C. A. nomen.*)
α-Nitroso-β-naphthol



or



$= C_{10}H_7NO_2 = 173$

STATISTICS.—Manufactured in 1918 and 1919, but in undisclosed quantities

FORMATION.—From β-naphthol by action of nitrous acid

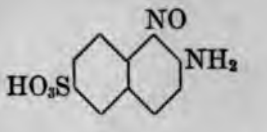
LITERATURE.—Cain, Intermediate Products (2d Ed.), 216
Lange, Zwischenprodukte, #2330

Dyes Derived from 1-Nitroso-2-naphthol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITROSO DYE			
2	Gambine Y		[This is 1-Nitroso-2-naphthol]	M
	MONOAZO DYES			
107	Sulfamine Brown A	I '14:— 132 M '18:— ? M '19:— ? I '20:— 2,630 M '20:— ?	α-Naphthylamine	M
116	Sulfamine Brown B		β-Naphthylamine	M
	DISAZO DYES			
331	Alkali Dark Brown GV		Benzidine Gamma Acid	D

1-Nitroso-2-naphthylamine-6-sulfonic Acid

6-Amino-5-nitroso-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



$=C_{10}H_8N_2O_4S=252$

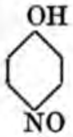
Formation.—One part of 1-nitroso-2-naphthol-6-sulfonic acid (nitroso-Schaeffer's Acid) is heated with one part of 25 per cent ammonia for three hours at 60°

Literature.—Lange, Zwischenprodukte, #2479

Dye Derived from 1-Nitroso-2-naphthylamine-6-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
675	AZINE DYE Rosinduline G		Aniline (2 mols)	A

p-Nitroso-*p*henol



$=C_6H_5NO_2=123$

Statistics.—Imported '14:—very small amount
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—155,273
Manufactured '20:—167,855

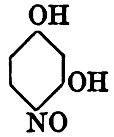
Formation.—From phenol by action of nitrous acid in the cold

Literature.—Cain, Intermediate Products (2d Ed.), 111
Lange, Zwischenprodukte, 573

Dye Derived from *p*-Nitroso-phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYE			
748	Hydron Blue	I '14:—296,723 I '20:— 19,210 M '20:— ?	Carbazole [S+Na_2S]	V

4-Nitroso-resorcinol



$= C_6H_5NO_3 = 139$

FORMATION.—Resorcinol is dissolved in alcohol, one molecule of caustic soda added, and then gradually one molecule of isoamyl nitrite is introduced with cooling

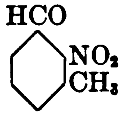
LITERATURE.—Beilstein, Organische Chemie (3d Ed.), II, 923

Dye Derived from 4-Nitroso-resorcinol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
648	Iris Blue		Resorcinol [Bromination]	A

2-Nitro-*m*-tolualdehyde (*C. A. nomen.*)

o-Nitro-tolylaldehyde



$= C_8H_7NO_3 = 165$

FORMATION.—*m*-Tolylaldehyde is nitrated, and then the two isomeric nitro-compounds separated by distillation under reduced pressure

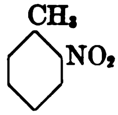
LITERATURE.—Lange, Zwischenprodukte, #758, 759
Ger. Pat. 113,604 Frdl. 6, 128

Dye Derived from 2-Nitro-*m*-tolualdehyde

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
888	INDIGO GROUP DYE Indigo MLB/T	I '14:— 10,730 I '20:— 827	2-Nitro-*m*-tolualdehyde (2 mols) [Acetone, NaOH]	V

o-Nitro-*t*oluene (*C. A. nomen.*)

o-Nitro-toluol



$= C_7H_7NO_2 = 137$

STATISTICS.—Imported '14:— 42,482 lbs.
Manufactured '17:—1,002,822 lbs.
Manufactured '18:—1,240,499 lbs.
Manufactured '19:—1,366,599 lbs.
Manufactured '20:—2,173,279 lbs.

FORMATION.—Toluene is nitrated with mixed nitric and sulfuric acids to a mixture of *o*- *and* *p*-nitro-toluenes. The separation is effected by means of fractional distillation and freezing—the *o*-isomer being distilled off and the *p*-body separated as a solid by cooling the still residue

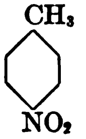
LITERATURE.—Cain, Intermediate Products (2d Ed.), 32
Lange, Zwischenprodukte, #230–233

Dyes Derived from *o*-Nitro-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
513	New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	Anhydro-formaldehyde-*o*-toluidine *or* Diamino-*o*-di-tolyl-methane *o*-Toluidine	B

***p*-Nitro-*t*oluene** (*C. A. nomen.*)

p-Nitro-toluol



$= C_7H_7NO_2 = 137$

STATISTICS.—Imported '14:—very small
Manufactured '17:—567,314 lbs.
Manufactured '18:—670,645 lbs.
Manufactured '19:—1,263,056 lbs.
Manufactured '20:—2,004,089 lbs.

FORMATION.—Toluene is nitrated with mixed nitric and sulfuric acids to a mixture of *o*- *and* *p*-nitro-toluene. The separation is effected by means of fractional distillation and freezing,—the *o*-isomer being distilled off and the *p*-body separated as a solid by cooling the still residue

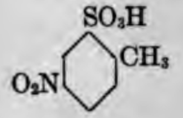
LITERATURE.—Cain, Intermediate Products (2d Ed.), 32
Lange, Zwischenprodukte, #230–233

Dye Derived from *p*-Nitro-toluene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	Hydrol *or* 4:4′-Tetraethyl-diamino-benzohydrol	B

5-Nitro-*o*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

p-Nitro-toluene-*o*-sulfonic Acid ($CH_3 = 1$)



$= C_7H_7NO_5S = 217$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From *p*-nitro-toluene by sulfonation with oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 34
Lange, Zwischenprodukte, #837

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYES			
9	Sun Yellow Direct Yellow R	I '14:—232,688 M '17:—420,685 M '18:—307,702 M '19:—440,924 I '20:— 1,404 M '20:—348,849	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Alkalies]	D
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M '19:— ?	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Alkalies; Oxidation]	D

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Stilbene Dyes (*continued*)			
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Alkalies; Oxidation]	D
12	Diphenyl Citronine G		*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Aniline (2 mols)	D
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols)	D
14	Diphenyl Chrysoine	I '14:— 9,898	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Amino-phenol (2 mols) [Ethylation]	D
15	Chicago Orange G		Benzidine	D
16	Curcuphenine		*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols)	D
17	Chlorophenine		*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) Dehydro-thio-*p*-toluidine-sulfonic Acid (2 mols) [Reduction]	D

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid (*continued*)

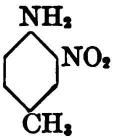
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
205	Diphenyl Chrysoine RR		*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols) Phenol [Ethylation]	D
206	Diphenyl Catechine G	I '14:— 8,642	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols) Dimethyl-gamma Acid	D
207	Diphenyl Fast Brown G	I '14:— 992	*p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) *p*-Phenylene-diamine (2 mols) Phenyl-gamma Acid	D

p-Nitro-toluene-o-sulfonic Acid ($CH_3 = 1$)

See, 5-Nitro-*o*-toluene-sulfonic Acid (*C. A. nomen.* $SO_3H = 1$)

2-Nitro-*p*-toluidine (*C. A. nomen.* $NH_2 = 1$)

m-Nitro-*p*-toluidine ($CH_3 = 1$)



$= C_7H_8N_2O_2 = 152$

STATISTICS.—Imported '14:—10,513 lbs.
Manufactured '17:— ?
Manufactured '18:—24,415 lbs.
Manufactured '19:—58,454 lbs.
Manufactured '20:—71,197 lbs.

FORMATION.—From acetyl-*p*-toluidine by nitration

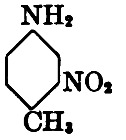
LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #790

Dye Derived from 2-Nitro-*p*-toluidine (*$NH_2=1$*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
73	Pigment Fast Red HL Lithol Fast Red RL Lithol Fast Scarlet	I '14:— 49,708 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,001 M '20:— ?	β-Naphthol	CL

3-Nitro-*p*-toluidine (*C. A. nomen.* *$NH_2=1$*)

o-Nitro-*p*-toluidine (*$CH_3=1$*)



$= C_7H_8N_2O_2 = 152$

STATISTICS.—20,737 lbs. imported in fiscal year 1914

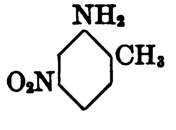
FORMATION.—From dinitro-toluene by partial reduction, using iron and sulfur dioxide

LITERATURE.—Lange, Zwischenprodukte, #536, 539, 790, 791

•

5-Nitro-*o*-toluidine (*C. A. nomen.* *$NH_2=1$*)

p-Nitro-*o*-toluidine ($CH_3=1$)



$= C_7H_8N_2O_2 = 152$

STATISTICS.—Imported '14:—30,642 lbs.
Manufactured '20:— ?

FORMATION.—From *o*-toluidine by nitration

LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #790

Dyes Derived from 5-Nitro-*o*-toluidine ($NH_2=1$)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITRO DYE			
8	Pigment Chlorine	M '19:— ? M '20:— ?	5-Nitro-*o*-toluidine (2 mols)	CL
	MONOAZO DYE			
72	Pigment Orange R		β-Naphthol	CL MF

***m*-Nitro-*p*-toluidine** ($CH_3=1$)

See, 2-Nitro-*p*-toluidine (*C. A. nomen.* $NH_2=1$)

***o*-Nitro-*p*-toluidine** ($CH_3=1$)

See, 3-Nitro-*p*-toluidine (*C. A. nomen.* $NH_2=1$)

***p*-Nitro-*o*-toluidine** ($CH_3=1$)

See, 5-Nitro-*o*-toluidine (*C. A. nomen.* $NH_2=1$)

***o*-Nitro-toluol**

See, *o*-Nitro-toluene (*C. A. nomen.*)

***p*-Nitro-toluol**

See, *p*-Nitro-toluene (*C. A. nomen.*)

***o*-Nitro-tolylaldehyde**

See, 2-Nitro-*m*-tolualdehyde (*C. A. nomen.*)

3-Nitro-1:2:6-trihydroxy-anthraquinone

See, 3-Nitro-flavopurpurin (*C. A. nomen.*)

NW Acid

See, Nevile-Winther's Acid

Ortho = *o*

Note.—This is not considered in the alphabetical arrangement, e.g., ortho-Toluidine is indexed as o-Toluidine under "T." However, o-Toluidine precedes p-Toluidine

Oxy-compounds

See, Hydroxy-compounds

Oxy-juglone

See, Naphthazarin

α-Oxy-naphthoic Acid

See, 1-Hydroxy-2-naphthoic Acid

β-Oxy-naphthoic Acid

See, 3-Hydroxy-2-naphthoic Acid

α-Oxy-naphthoic-sulfonic Acid

1-Hydroxy-2-naphthoic-4-sulfonic Acid (*not considered herein*)

β-Oxy-naphthoic-sulfonic Acid L

2-Hydroxy-3-naphthoic-6-sulfonic Acid (*not considered herein*)

β-Oxy-naphthoic-sulfonic Acid S

2-Hydroxy-3-naphthoic-8-sulfonic Acid (*not considered herein*)

Para = *p*

Note.—This is not considered in the alphabetical arrangement, e.g., para-Nitro-aniline is indexed as p-Nitro-aniline under "N." However, p-Nitro-aniline follows m-Nitro-aniline

Peri Acid

See, 1-Naphthylamine-8-sulfonic Acid

Peri-naphthylene-diamine

1: 8-Naphthylene-diamine (*not considered herein*)

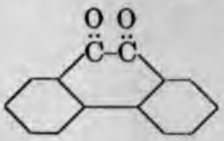
Phenanthraquinone

See, Phenanthrene-quinone

Phenanthrene-quinone (*C. A. nomen.*)

9: 10-Dihydro-9: 10-diketo-phenanthrene

Phenanthraquinone



$=C_{14}H_8O_2=208$

Formation.—From phenanthrene by oxidation with sodium bichromate and sulfuric acid

Literature.—Lange, Zwischenprodukte, #648

Green, Organic Coloring Matters (1908), 65

Dye Derived from Phenanthrene-quinone

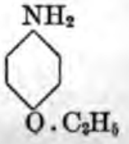
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
668	Azine Dye Flavinduline O	I ’14:— 660	*o*-Amino-diphenyl-amine	B

Phenanthroquinolinone (*C. A. nomen.*)

See, Benzanthrone-quinoline

***p*-Phenetidine** (*C. A. nomen.*)

p-Amino-phenol Ethyl Ether



$=C_8H_{11}NO=137$

STATISTICS.—Imported '14:—125,524 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?

FORMATION.—From *p*-amino-phenol by ethylation of the hydroxyl. Before ethylation the amino group is protected; for example, by forming the benzylidine compound by treatment of the *p*-amino-phenol with benzaldehyde

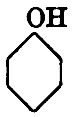
LITERATURE.—Lange, Zwischenprodukte, #590

Dye Derived from *p*-Phenetidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
584	XANTHONE DYE Fast Acid Blue R	I '14:— 4,022 I '20:— 130	*p*-Phenetidine (2 mols) 3:6-Dichloro-phthalic Anhydride Resorcinol (2 mols) [PCl_5; Sulfonation]	A

Phenol (*C. A. nomen.*)

Carbolic Acid



$=C_6H_6O=94$

STATISTICS.—Imported '14:— 10,108,781 lbs.
Manufactured '17:— 64,146,499 lbs.
Manufactured '18:—106,794,277 lbs.
Manufactured '19:— 1,543,659 lbs.
Manufactured '20:— ?

FORMATION.—(1) By distillation from coal tar. (2) By synthesis from benzene, in which case the benzene is sulfonated to benzene-sulfonic acid, which is then fused with caustic soda

LITERATURE.—Cain, Intermediate Products, 104
Lange, Zwischenprodukte, #142–145

Dyes Derived from Phenol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITRO DYE			
5	Picric Acid	M '19:— ? M '20:— ?		B
	MONOAZO DYES			
125	Diazine Black	I '14:— 2,630 I '20:— 701	*p*-Tolylene-diamine *o*-Toluidine Aniline *or* *o*-Toluidine *or* [Safranine]	B
205	Diphenyl Chrysoine RR		*p*-Nitro-toluene-*o*-sulfonic Acid *p*-Phenylene-diamine	D
	DISAZO DYES			
303	Brilliant Yellow Paper Yellow	I '14:—278,000 M '17:— ? M '18:— 1,664 M '19:— 48,723 I '20:— 126 M '20:— 91,218	Diamino-stilbene-disulfonic Acid Phenol (2 mols)	D A
304	Chrysophenine G	I '14:—157,799 M '17:— ? M '18:— 41,663 M '19:— 86,795 I '20:— 3,661 M '20:—247,202	Diamino-stilbene-disulfonic Acid Phenol (2 mols) [Ethylation]	D
315	Congo Orange G	I '14:— 1,623 I '20:— 75	Benzidine Amino-R Acid [Ethylation]	D
319	Diamine Scarlet B	I '14:— 41,175 I '20:— 10,565	Benzidine G Acid	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Tolidine Amino-R Acid [Ethylation]	D

Dyes Derived from Phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
404	Diamine Yellow N	M '17:— ? I '20:— 313	Ethoxy-benzidine Salicylic Acid [Ethylation]	D
431	Diamine Golden Yellow		1: 5-Naphthylene-diamine-3: 7-disulfonic Acid Phenol (2 mols) [Ethylation]	D
	TRISAZO DYES			
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine H Acid Aniline	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine H Acid *o*-Chloro-*p*-nitro-aniline	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine H Acid 2: 5-Dichloro-aniline	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Benzidine H Acid *p*-Nitro-aniline	D
	TRIPHENYL-METHANE DYES			
515	Methyl Violet	I '14:—255,063 M '17:—375,107 M '18:—632,196 M '19:—574,436 I '20:— 3,312 M '20:—600,873	Dimethyl-aniline (3 mols)	B

Dyes Derived from Phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 M '17:— ? I '20:— 3,313	[Benzylation of Methyl Violet] *or* Dimethyl-aniline (3 mols) Benzyl Chloride	B
519	Methyl Green		[Methyl Chloride of Methyl Violet] *or* Dimethyl-aniline (3 mols) [Methyl Chloride]	B
555	Aurine	I '14:— 784 M '18:— ? I '20:— 336	Phenol (3 mols) [Heated with oxalic and sulfuric acids]	ss CL
556	Red Coralline		[Aurine treated with ammonia] *or* Phenol (3 mols) [Heated with oxalic and sulfuric acid; treated with ammonia]	CL
	AZINE DYE			
693	Milling Blue	I '14:— 3,082	Aniline (2 mols) Phenyl-*a*-naphthyl-amine (2 mols) [Sulfonation]	M
	SULFUR DYES			
718	St. Denis Black B		*p*-Phenylene-diamine Nitro-benzene [S_2Cl_2, S, Na_2S]	S

Dyes Derived from Phenol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES (*continued*)			
732	Autogene Black	I '14:— 7,495	4-Amino-4′-hydroxy-diphenylamine *or* 2:4-Diamino-4′-hydroxy-diphenylamine [S_2Cl_2; S+Na_2S]	S
	ANTHRAQUINONE AND ALLIED DYES			
775	Alizarin Dark Green W		Naphthazarin *or* Dinitro-naphthalene	M

Phenyl-*p*-amino-benzyl-*o*-toluidine (CH_3 = 1)

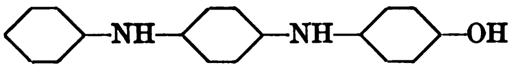
See, N^3-Benzyl-N^1-phenyl-4-*m*-tolylene-diamine (*NH_2 = 1*)

Phenyl-*p*-amino-ethyl-*o*-toluidine (CH_3 = 1)

See, N^3-Ethyl-N^1-phenyl-4-*m*-tolylene-diamine (*NH_2 = 1*)

4-Phenylamino-4′-hydroxy-diphenylamine

p-(*p*-Anilino-anilino)-phenol (C. A. nomen.)



$= C_{18}H_{16}N_2O = 276$

FORMATION.—(1) From *p*-amino-diphenylamine and phenol by oxidation in acid solution and then reduction of the indophenol. (2) From diphenylamine and *p*-amino-phenol (*p*-nitroso-phenol) by oxidation and then reduction of the indophenol

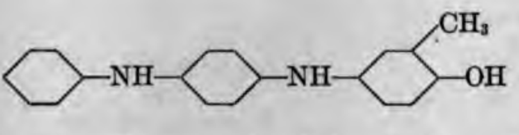
LITERATURE.—Cain, Intermediate Products (2d Ed.), 76
Lange, Zwischenprodukte, #1721
Lange, Schwefelfarbstoffe, 161

Dye Derived from 4-Phenylamino-4′-hydroxy-diphenylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
735	SULFUR DYE Pyrogene Indigo	I '14:— 22,661	[S+Na$_2$S]	S

4-Phenylamino-4′-hydroxy-(phenyl-3′-tolylamine)

4-(*p*-Anilino-anilino)-*o*-cresol (*C. A. nomen. OH* = *1*)



$=C_{19}H_{18}N_2O=290$

FORMATION.—From *p*-amino-diphenylamine and *o*-cresol by oxidation and subsequent reduction of the indophenol formed

LITERATURE.—Lange, Zwischenprodukte, #1721

Dye Derived from 4-Phenylamino-4′-hydroxy-(phenyl-3′-tolylamine)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
735	SULFUR DYE Pyrogene Indigo	I '14:— 22,661	[S+Na$_2$S]	S

2-Phenylamino-8-naphthol-6-sulfonic Acid

See, Phenyl-gamma Acid

Phenyl-*m*-amino-phenol

See, *m*-Hydroxy-diphenylamine

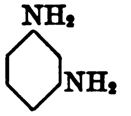
Phenyl-*p*-amino-*o*-toluidine

See, N^1-Phenyl-4-*m*-tolylene-diamine

Phenyl-azo-aniline (*C. A. nomen.*)

See, Amino-azo-benzene

m-Phenylene-diamine



$= C_6H_8N_2 = 108$

STATISTICS.—Manufactured '17:—220,956 lbs.
Manufactured '18:—641,299 lbs.
Manufactured '19:—609,789 lbs.
Manufactured '20:—658,313 lbs.

FORMATION.—From *m*-dinitro-benzene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 85
Lange, Zwischenprodukte, #550

Dyes Derived from *m*-Phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
33	Chrysoidine Y	I '14:— 63,303 M '17:—195,756 M '18:—376,495 M '19:—314,581 M '20:—585,648	Aniline	B
88	Acid Anthracene Brown R	I '14:— 33,053 M '17:— ? M '19:— ? I' 20:— 1,400 M '20:— ?	Picramic Acid [Substituted phenylene-diamine-sulfonic Acids]	ACr
89	Metachrome Brown B	I '14:— 1,001 M '17:— ? M '18:—349,961 M '19:— ? M '20:—192,914	Picramic Acid	M

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
154	Acid Alizarine Brown B Palatine Chrome Brown W	I '14:— 18,264 M '17:— ? M '18:— ? M '19:— ? I '20:— 845 M '20:— ?	*o*-Amino-phenol-*p*-sulfonic Acid	M
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	Dehydro-thio-*p*-toluidine-sulfonic Acid *or* Primuline	D
	DISAZO DYES			
208	Leather Brown	I '14:— 500 M '19:— ? M '20:— ?	*p*-Phenylene-diamine (2 mols)	B
209	Terracotta FC	I '14:— 551	Primuline *or* Dehydro-thio-*p*-toluidine-sulfonic Acid Naphthionic Acid	D
239	Azotol C		*p*-Amino-acetanilide β-Naphthol	MF
283	Bismarck Brown	I '14:— 35,020 M '17:—309,857 M '18:—378,208 M '19:—412,574 M '20:—514,218	*m*-Phenylene-diamine (3 mols)	B
285	Toluylene Brown G		3:5-Diamino-*p*-toluene-sulfonic Acid	D
329	Diamine Brown V	M '19:— ?	Benzidine Gamma Acid	D

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
435	Janus Brown B		Trimethyl-*m*-amino-phenyl-ammonium Chloride *or* *p*-Amino-benzyl-diethylamine α-Naphthylamine *or* *m*-Toluidine Aniline	B
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6-*and* 7-sulfonic Acids *p*-Phenylene-diamine Gamma Acid	D
437	Isodiphenyl Black R		*p*-Phenylene-diamine Gamma Acid Resorcinol	D
448	Diamine Bronze G	I '14:— 4,449	Benzidine Salicylic Acid H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine Salicylic Acid 2R Acid	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine Salicylic Acid 2R Acid	D
457	Trisulfon Brown GG	I '14 — 7,562 I '20:— 38,411	Dianisidine Salicylic Acid 2R Acid	D

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
458	Carbon Black		*p*-Phenylene-diamine-sulfonic Acid (from *p*-nitro-aniline-*o*-sulfonic Acid) 1-Naphthylamine-6(7)-sulfonic Acid *m*-Phenylene-diamine (2 mols)	D
461	Coomassie Union Black		1: 4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid *m*-Phenylene-diamine (2 mols)	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline H Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	Benzidine H Acid 2: 5-Dichloro-aniline	D
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:—623,757	Benzidine Sulfanilic Acid Salicylic Acid	D
479	Dianil Black R		Benzidine Naphthionic Acid Chromotropic Acid	D

Dyes Derived from ***m*****-Phenylene-diamine** (*continued*)

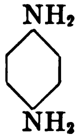
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TETRAKISAZO DYES			
485	Benzo Brown G	I '14:— 41,905 M '17:— ? M '18:— ? M '19:— 83,506 I '20:— 2,286 M '20:—109,648	Sulfanilic Acid (2 mols) *m*-Phenylene-diamine (3 mols)	D
486	Direct Brown J	I '14:— 3,640	*m*-Amino-benzoic Acid (2 mols) *m*-Phenylene-diamine (3 mols)	D
487	Benzo Brown B	I '14:— 438 M '20:— ?	Naphthionic Acid (2 mols) *m*-Phenylene-diamine (3 mols)	D
488	Toluylene Brown R	I '14:— 201	Naphthionic Acid (2 mols) 3:5-Diamino-*p*-toluene-sulfonic Acid *m*-Phenylene-diamine (2 mols)	D
490	Cotton Brown A	I '14:— 29,074	Benzidine Naphthionic Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D
491	Dianil Black PR		Benzidine-sulfonic Acid Gamma Acid (2 mols) *m*-Phenylene-diamine (2 mols)	D
492	Anthracene Acid Brown B		Amino-salicylic Acid (2 mols) 1-Naphthylamine-6-sulfonic Acid (2 mols)	M ACr

Dyes Derived from *m*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ACRIDINE DYE			
607	Rheonine	I '14:— 19,704	Ketone	B
	AZINE DYE			
669	Neutral Violet		Dimethyl-*p*-phenylene-diamine (2 mols) [Oxidation]	

p-Phenylene-diamine

Note.—In a number of cases where p-phenylene-diamine was apparently used, actually its acetyl-derivative p-amino-acetanilide, or even p-nitro-aniline, was employed; and after the first coupling, the second amino group was then freed and diazotized. Here both compounds are generally indexed.



$= C_6H_8N_2 = 108$

STATISTICS.—Imported '14:— 11,088 lbs.
Manufactured '17:—272,056 lbs.
Manufactured '18:—215,148 lbs.
Manufactured '19:—234,332 lbs.
Manufactured '20:— ?

FORMATION.—(1) From amino-azo-benzene by reduction. (2) From *p*-nitro-aniline by reduction

LITERATURE.—Cain, Intermediate Products (2d Ed.), 87
Lange, Zwischenprodukte, #552–555

Dyes Derived from *p*-Phenylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Stilbene Dye			
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols)	D
	Monoazo Dyes			
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,182 M '20:— ?	Chromotropic Acid [The *p*-Phenylene-diamine from *p*-Nitro-aniline *or* *p*-Amino-acetanilide]	A
205	Diphenyl Chrysoine RR		*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Phenol [Ethylation]	D
206	Diphenyl Catechine G	I '14:— 8,642	*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Dimethyl-gamma Acid	D
207	Diphenyl Fast Brown G	I '14:— 992	*p*-Phenylene-diamine (2 mols) *p*-Nitro-toluene-*o*-sulfonic Acid (2 mols) Phenyl-gamma Acid	D
	Disazo Dyes			
208	Leather Brown	I '14:— 500 M '19:— ? M '20:— ?	*p*-Phenylene-diamine (2 mols) *m*-Phenylene-diamine	B
290	Violet Black		Nevile-Winther's Acid *a*-Naphthylamine	D
291	Azo Alizarin Bordeaux W		Salicylic Acid Nevile-Winther's Acid	M

Dyes Derived from *p*-Phenylene-diamine (*continued*)

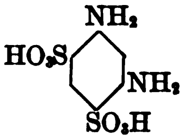
Schultz Number or Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
292	Azo Alizarin Black I		Salicylic Acid Chromotropic Acid	M
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6- *and*-7-sulfonic Acids Gamma Acid *m*-Phenylene-diamine	D
437	Isodiphenyl Black R		Gamma Acid Resorcinol *m*-Phenylene-diamine	D
	OXAZINE DYE			
621	Cresyl Blue 2BS		5-Dimethylamino-2-nitroso-*p*-cresol	B
	AZINE DYES			
695	Paraphenylene Violet	I '20:— 337	*a*-Amino-azo-naphthalene	B
701	Paraphenylene Blue R		Amino-azo-benzene	B
702	Para Blue		Aniline (3–4 mols) *o*-Toluidine *p*-Toluidine *or* [Spirit Blue]	B
	SULFUR DYES			
713	Thiophor Bronze 5G	M '19:— ?	[*p*-Amino-acet-black] [Sulfur]	S
714	Thiophor Yellow Bronze C		*p*-Amino-acetanilide Benzidine [Sulfur]	S
718	St. Denis Black B		Phenol Nitro-benzene [S_2Cl_2, S, Na_2S]	S

Dyes Derived from *p*-Phenylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
727	Auronal Black B		1-Chloro-2:4-dinitrobenzene [Glycerol; $S+Na_2S$]	S
	ANILINE BLACK GROUP			
923	Ursol D, DB		[Oxidation on hair]	Fur

m-Phenylene-diamine-disulfonic Acid

4:6-Diamino-*m*-benzene-disulfonic Acid (*C. A. nomen.* $SO_3H = 1$)



$=C_6H_8N_2O_6S_2=268$

FORMATION.—From *m*-phenylene-diamine hydrochloride by treating it with five parts of 40 per cent oleum, heating at 100° for several hours, then at 120° for 6–10 hours

LITERATURE.—Lange, Zwischenprodukte, #1146, 1147
Green, Organic Coloring Matters (1908), 36

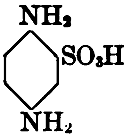
Dyes Derived from *m*-Phenylene-diamine-disulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
192	Cotton Orange G	I '14:— 1,877	Primuline	D
	DISAZO DYES			
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	Primuline-sulfonic Acid Metanilic Acid	D
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Benzidine Nitro-*m*-phenylene-diamine	D

p-Phenylene-diamine-sulfonic Acid

2: 5-Diamino-*b*enzene-sulfonic Acid (*C. A. nomen.*)

Note.—As a rule this compound is not used as such, being formed as the azo derivative in the dye molecule from the reduction of the azo derivative of p-nitro-aniline-o-sulfonic acid



$= C_6H_8N_2O_3S = 188$

FORMATION.—From *p*-nitro-aniline-*o*-sulfonic acid by reduction

LITERATURE.—Lange, Zwischenprodukte, #920–924

Dye Derived from *p*-Phenylene-diamine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
458	Carbon Black		1-Naphthylamine-6(7)-sulfonic Acid *m*-Phenylene-(Tolylene-)diamine *or* 1:3-Naphthylene-diamine-6-sulfonic Acid (2 mols)	D

FORMATION.—From gamma acid (2-amino-8-naphthol-6-sulfonic acid) by heating with aniline and aniline hydrochloride at 160°

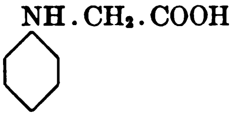
LITERATURE.—Lange, Zwischenprodukte, #2846–2847

Dyes Derived from Phenyl-gamma Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
207	Diphenyl Fast Brown G	I '14:— 992	*p*-Nitro-toluene-*o*-sulfonic Acid *p*-Phenylene-diamine	D
	DISAZO DYES			
349	Diamine Brown B	I '20:— 24	Benzidine Salicylic Acid	D
	TRISAZO DYE			
445	Crumpsall Direct Fast Brown O		Benzidine Salicylic Acid Aniline	D

Phenyl-glycine

N-Phenyl-*g*lycine (*C. A. nomen.*)



$= C_8H_9NO_2 = 151$

STATISTICS.—Manufactured '17:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By action of chloro-acetic acid on aniline

LITERATURE.—Cain, Intermediate Products (2d Ed.), 153
Lange, Zwischenprodukte, #96–109, 111

Dyes Derived from Phenyl-glycine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Phenyl-glycine (2 mols) [Sodamide]	V
876	Indigo MLB Indigo White		Phenyl-glycine (2 mols) [Sodamide, Reduction] *or* [Indigo, Reduction]	V
877	Indigotine	I '14:— 19,329 M' 17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Phenyl-glycine (2 mols), etc. *or* [Indigo, Sulfonation]	A
878	Indigotine P		Phenyl-glycine (2 mols), etc. *or* [Indigo, Sulfonation]	A
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,640 M '20:— ?	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V

Dyes Derived from Phenyl-glycine (*continued*)

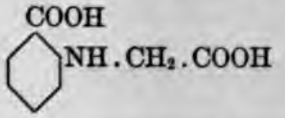
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phenyl-glycine (2 mols), etc. *or* [Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phenyl-glycine (2 mols), etc. *or* [Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,117 I '20:— 3,503	Phenyl-glycine (2 mols), etc. *or* [Indigo, Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phenyl-glycine (2 mols), etc. *or* [Indigo, Chlorination, Bromination]	V
889	Indigo Yellow 3G		Phenyl-glycine (2 mols), etc. Benzoyl chloride *or* [Indigo, Benzoyl chloride]	V

Dyes Derived from Phenyl-glycine (*continued*)

Schultz Numebr for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYE (*continued*)			
890	Ciba Yellow G	I '14:— 48	Phenyl-glycine (2 mols), etc. Benzoyl chloride *or* [Indigo, Benzoyl chloride, Bromination]	V

Phenyl-glycine-*o*-carboxylic Acid

N-(Carboxy-methyl)-anthranilic Acid (*C. A. nomen.*)



$= C_9H_9NO_4 = 195$

FORMATION.—Phthalic anhydride is converted through phthalimide into anthranilic acid. This latter by reaction with chloro-acetic acid forms the phenyl-glycine-*o*-carboxy acid

LITERATURE.—Lange, Zwischenprodukte, #379, 383–393

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Phenyl-glycine-*o*-carboxylic Acid (2 mols) [Sodamide]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dy: Application Class*
	INDIGO GROUP DYES (*continued*)			
876	Indigo MLB Indigo White		Phenyl-glycine-*o*-carboxylic Acid (2 mols) [Sodamide, Reduction] *or* [Indigo, Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Sulfonation]	A
878	Indigotine P		Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Sulfonation]	A
879	Bromo Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	Phenyl-glycine-*o*-carboxylic Acid (2 mols) etc. *or* [Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

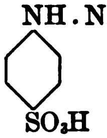
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
882	Indigo MLB/5B Ciba Blue G	I '14:— 4,356 I '20:— 1,002	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. *or* [Indigo, Bromination, Chlorination]	V
889	Indigo Yellow 3G		Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. Benzoyl chloride *or* [Indigo, Benzoyl chloride]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
890	Ciba Yellow G	I' 14:— 48	Phenyl-glycine-*o*-carboxylic Acid (2 mols), etc. Benzoyl chloride [Bromination] *or* [Indigo Yellow 3G, Bromination]	V

Phenyl-hydrazine-*p*-sulfonic Acid

p-Hydrazino-*b*enzene-sulfonic Acid (*C. A. nomen.*)



$= C_6H_8N_2O_3S = 188$

STATISTICS.—Manufactured '20:—441,117 lbs.

FORMATION.—(1) Sulfanilic acid is diazotized and then reduced with sodium bisulfite. (2) Aniline is diazotized and reduced with sodium bisulfite, forming phenyl-hydrazine, which is then sulfonated with 66° sulfuric acid at 100°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 49
Lange, Zwischenprodukte, #629

Dyes Derived from Phenyl-hydrazine-*p*-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES			
19	Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	Aniline [Ethyl Aceto-acetate]	A
20	Flavazine S	I '14:— 81,375 I '20:— 1,500	Aniline [Ethyl Oxal-acetate]	A

Dyes Derived from Phenyl-hydrazine-*p*-sulfonic Acid (*continued*)

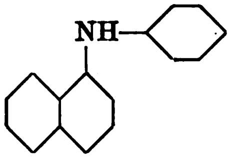
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	PYRAZOLONE DYES (*continued*)			
23	Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	Phenyl-hydrazine-*p*-sulfonic Acid (2 mols) Dihydroxy-tartaric Acid *or* Sulfanilic Acid [Ethyl Oxal-acetate]	A
27	Dianil Yellow 2R		Primuline-sulfonic Acid [Ethyl Aceto-acetate]	D

1-Phenyl-3-methyl-5-pyrazolone

See, 3-Methyl-1-phenyl-5-pyrazolone

Phenyl-α-naphthylamine

N-Phenyl-1-naphthylamine (*C. A. nomen.*)



$= C_{16}H_{13}N = 219$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—From α-naphthylamine hydrochloride and aniline by heating together

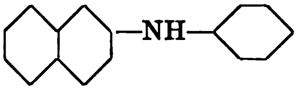
LITERATURE.—Cain, Intermediate Products (2d Ed.), 187
Cf. Lange, Zwischenprodukte, #2827
Thorpe, Dic. Chemistry, **3**, 587

Dyes Derived from Phenyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
263	Jet Black R		Aniline-2:4-disulfonic Acid α-Naphthylamine	A
361	Sulfonazurine	I '14:— 300	Benzidine-sulfon-disulfonic Acid Phenyl-α-naphthylamine (2 mols)	D
	DIPHENYL-NAPHTHYL-METHANE DYE			
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 11,782 M '20:— ?	Ketone *or* Hydrol	B
	AZINE DYE			
693	Milling Blue	I '14:— 3,082	Aniline (2 mols) Phenyl-α-naphthylamine (2 mols) Phenol [Sulfonation]	M

Phenyl-β-naphthylamine

N-Phenyl-2-naphthylamine (*C. A. nomen.*)



$= C_{16}H_{13}N = 219$

FORMATION.—From β-naphthol and aniline (or hydrochloride) by heating together in an open vessel to around 200°

LITERATURE.—Lange, Zwischenprodukte, #2827
Thorpe, Dic. Chemistry, **3**, 599

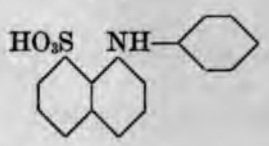
Dye Derived from Phenyl-β-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYE			
676	Neutral Blue	I '14:— 615	Nitroso-dimethyl-aniline	B

Phenyl-1-naphthylamine-8-sulfonic Acid

8-Anilino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

Phenyl-peri Acid



$=C_{16}H_{13}NO_3S=299$

STATISTICS.—Imported '14:—9,139 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—1-Naphthylamine-8-sulfonic acid, aniline, and aniline hydrochloride are heated together in an autoclave

LITERATURE.—Cain, Intermediate Products (2d Ed.), 194

Dyes Derived from Phenyl-1-naphthylamine-8-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
85	Omega Chrome Black PV		2-Amino-6-nitro-*p*-cresol	ACr
188	Tolyl Blue SR Sulfon Acid Blue R	I '14:— 45,038 M '17:— ? M '18:— ? M '19:— ? M '20:—454,185	H Acid	A

Dyes Derived from Phenyl-1-naphthylamine-8-sulfonic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
256	Sulfon Black 3B		Metanilic Acid α-Naphthylamine	A
257	Sulfoncyanine	I '14:—145,649 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid α-Naphthylamine	A
265	Sulfoncyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid α-Naphthylamine *or* 1-Naphthylamine-6- *and* 7-sulfonic Acids	A

***N*-Phenyl-*o*-phenylene-diamine** (*C. A. nomen.*)

See, *o*-Amino-diphenylamine

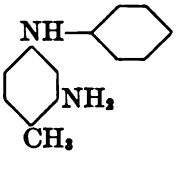
***N*-Phenyl-*p*-phenylene-diamine** (*C. A. nomen.*)

See, *p*-Amino-diphenylamine

N^1-Phenyl-4-*m*-tolylene-diamine (*C. A. nomen.* $NH_2 = 1$)

Phenyl-*p*-amino-*o*-toluidine ($CH_3 = 1$)

3-Amino-4-methyl-diphenylamine



$= C_{13}H_{14}N_2 = 198$

FORMATION.—From *m*-tolylene-diamine hydrochloride by melting with aniline at 220–270°

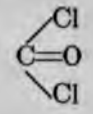
LITERATURE.—Lange, Zwischenprodukte, #1621, 1622

Dyes Derived from N^1-Phenyl-4-*m*-tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Azine Dyes			
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	Nitroso-dimethyl-aniline	B
684	Rhoduline Red B		Nitroso-ethyl-aniline	B
684	Rhoduline Red G		Nitroso-ethyl-*o*-toluidine	B

Phosgene (*C. A. nomen.*)

Carbonyl Chloride



$=CCl_2O=99$

Statistics.—Imported '14:—very small

Manufactured in recent years in undisclosed quantities

Formation.—From chlorine and carbon monoxide, in presence of a catalyst, for example, a suitable charcoal

Literature.—Ullmann, Enzy. tech. Chemie, 3, 498

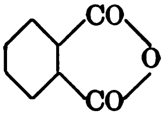
Dyes Derived from Phosgene

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid (2 mols) Aniline Amino-azo-benzene	D
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	Acetyl-*p*-phenylene-diamine (2 mols) Salicylic Acid (2 mols)	D

Dyes Derived from Phosgene (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline (3 mols)	B
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline (3 mols)	B
	ANTHRAQUINONE AND ALLIED DYES			
810	Helidone Yellow 3GN	I '14:— 20,744 I '20:— 2,515	2-Amino-anthraquinone (2 mols)	V

Phthalic Anhydride



$= C_6H_4O_3 = 148$

STATISTICS.—Imported '14:— 63,574 lbs.
Manufactured '17:—138,857 lbs.
Manufactured '18:—227,414 lbs.
Manufactured '19:—290,677 lbs.
Manufactured '20:—796,210 lbs.

FORMATION.—(1) Naphthalene is oxidized with air in presence of a catalyst. (2) Naphthalene is oxidized by means of sulfur trioxide in presence of mercury.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 162

Dyes Derived from Phthalic Anhydride

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES			
571	Rhodamine 6G	I '14:— 37,515 I '20:— 8,574	Ethyl-*m*-amino-phenol (2 mols) [Ethylation]	B
572	Rhodamine G	I '14:— 2,648 I '20:— 217	Diethyl-*m*-amino-phenol (2 mols) Aniline [removes one C_2H_5 group] *or* [Heating of Rhodamine B with aniline salt]	B
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? I '20:— 24,709 M '20:— ?	Diethyl-*m*-amino-phenol (2 mols) *or* Resorcinol (2 mols) [PCl_5; diethyl-amine]	B
574	Rhodamine 3B		Diethyl-*m*-amino-phenol (2 mols) [Ethyl esterification] *or* [Ethyl ester of Rhodamine B]	B
580	Fast Acid Violet B	I '14:— 20,688 I '20:— 2,907 M '19:— ?	Resorcinol (2 mols) Aniline *or* *p*-Toluidine (2 mols) [PCl_5; sulfonation] *or* [Dichloro-fluoresceine *and* Aniline *or* *p*-Toluidine; sulfonation]	A

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
581	Fast Acid Eosine G Fast Acid Phloxine A	I '14:— 650 I '20:— 5,234	Diethyl-*m*-amino-phenol (2 mols) [Sulfonation] *or* [Rhodamine B, sulfonated]	A
582	Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Resorcinol (2 mols) *o*-Toluidine (2 mols) [PCl_5, Sulfonation] *or* [Dichloro-fluoresceine *and* *o*-toluidine, Sulfonation]	A
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Resorcinol (2 mols) Mesidine (2 mols) [PCl_5, Sulfonation] *or* [Dichloro-fluoresceine *and* mesidine, sulfonation]	A
585	Uranine Fluoresceine	I '14:— 2,273 M '17:— ? M '19:— ? I '20:— 10	Resorcinol (2 mols)	A
586	Chrysoline	I '20:— 1,402	Resorcinol (2 mols) Benzyl Chloride	A
587	Eosine	I '14:— 94,528 M '17:— 68,496 M '18:—161,153 M '19:—121,303 I '20:— 296 M '20:— 85,489	Resorcinol (2 mols) [Bromine] *or* [Tetrabromo-fluoresceine]	A

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
588	Eosine Spirit Solubl. Methyl Eosine		Resorcinol (2 mols) [Bromine; Methyl esterification] *or* Eosine methyl ester]	ss
589	Eosine S	I '14:— 2,315 M '20:— ? M '20:— ?	Resorcinol (2 mols) [Bromine; Ethyl esterification] *or* [Eosine ethyl ester]	ss
590	Eosine BN Acid Eosine	I '14:— 20,143 I '20:— 1,132 M '20:— ?	Resorcinol (2 mols) [Bromination, Nitration] *or* [Dibromo-fluoresceine nitrated]	A
591	Erythrosine G	I '14:— 99	Resorcinol (2 mols) [Iodation] *or* [Diiodo-fluoresceine]	A
592	Erythrosine B	I '14:— 4,350 M '17:— 505 M '18:— 1,636 M '19:— ? I '20:— 9 M '20:— 6,874	Resorcinol (2 mols) [Iodation] *or* [Tetraiodo-fluoresceine]	A
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 7,469 M '20:— ?	Gallic Acid (2 mols) *or* Pyrogallol (2 mols)	M

Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
600	Coeruleine B	M '19:— ? M '20:— ?	Resorcinol (2 mols) [Dehydration] *or* [Fluoresceine dehydrated]	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Gallic Acid (2 mols) *or* Pyrogallol (2 mols) [Dehydration] *or* [Galleine dehydrated]	M
	QUINOLINE DYES			
612	Quinoline Yellow Spirit Soluble	I '14:— 79,553 I '20:— 205	Quinaldine	SS
613	Quinoline Yellow Water Soluble	I '14:— 15,354 I '20:— 34,440	Quinaldine [Sulfonation]	A
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G		Naphthalene	CL
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Gallic Acid	M
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 M '20:— 18,178,231 I '20:—520,347	Phthalic Anhydride (2 mols)	V

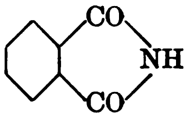
Dyes Derived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
876	Indigo MLB Indigo White		Phthalic Anhydride (2 mols) [Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 M '20:— 1,395,000 I '20:— 5,512	Phthalic Anhydride (2 mols) [Sulfonation]	A
878	Indigotine P		Phthalic Anhydride (2 mols) [Sulfonation]	A
879	Brom Indigo Rathjen	I '14:— 53,610 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phthalic Anhydride (2 mols) [Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Phthalic Anhydride (2 mols) [Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V

Dyes erived from Phthalic Anhydride (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phthalic Anhydride (2 mols) [Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Phthalic Anhydride (2 mols) [Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phthalic Anhydride (2 mols) [Chlorination, Bromination]	V
889	Indigo Yellow 3G		Phthalic Anhydride (2 mols) Benzoyl Chloride	V
890	Ciba Yellow G	I '14:— 48	Phthalic Anhydride (2 mols) Benzoyl Chloride [Bromination]	V

Phthalimide


$=C_8H_5NO_2=147$

STATISTICS.—Manufactured in 1920 in undisclosed amount

FORMATION.—By treatment of molten phthalic anhydride with gaseous ammonia

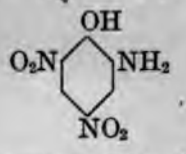
LITERATURE.—Cain, Intermediate Products (2d Ed.), 147

USES.—For preparation of anthranilic acid

Piria's Acid

See, Naphthionic Acid

Picramic Acid



$=C_6H_5N_3O_5=199$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—235,652 lbs.
Manufactured '19:—150,458 lbs.
Manufactured '20:—138,350 lbs.

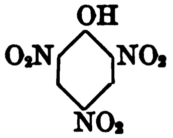
FORMATION.—From picric acid by reduction, using sodium hydrogen sulfide or sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 117

Dyes Derived from Picramic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application-Class*
	MONOAZO DYES			
88	Acid Anthracene Brown R	I '14:— 33,053 M '17:— ? M '19:— ? I '20:— 1,400 M '20:— ?	*m*-Phenylene-diamine-[sulfonic Acids]	ACr
89	Metachrome Brown B	I '14:— 1,001 M '17:— ? M '18:—349,961 M '19:— ? M '20:—192,914	*m*-Phenylene-diamine *or* *m*-Tolylene-diamine *or* Chloro-*m*-phenylene-diamine	M
90	Chrome Brown P		*m*-Amino-phenol	M
91	Anthracyl Chrome Green D	I '14:— 4,596 M '18:— ? I '20:— 3,316	Naphthionic Acid	ACr
92	Metachrome Bordeaux R		3-Amino-4-methyl-phenyl-*p*-tolyl-sulfamide	M
	DISAZO DYE			
219	Chrome Patent Green N		Aniline K Acid	ACr

Picric Acid



$=C_6H_3N_3O_7=229$

STATISTICS.—Manufactured in 1919 and 1920 in an indeterminate amount for dyeing purposes. Prior to 1919 it was made in very large quantities for explosive uses

FORMATION.—Phenol is sulfonated and then trinitrated

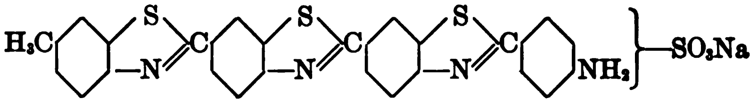
LITERATURE.—Cain, Intermediate Products (2d Ed.), 114
Lange, Zwischenprodukte, #1116–1121
Schultz, Farbstofftabellen (1914), #5

USES.—For the manufacture of picramic acid. It is also a dye, Schultz #5

Primuline-sulfonic Acid (Sodium Salt)

(This is the "Primuline" of commerce)

(Primuline "base" is the unsulfonated product)



$=C_{28}H_{17}N_4NaO_3S_4=608$

STATISTICS.—See #616 in following table

FORMATION.—*p*-Toluidine and sulfur are heated together, resulting in a mixture of primuline base and *p*-dehydro-thio-*p*-toluidine, known as primuline "melt." This can be separated by vacuum distillation. However it is generally sulfonated, using 23 per cent oleum, and then separated by the greater solubility of the ammonium salt of the primuline-sulfonic acid

LITERATURE.—Schultz, Farbstofftabellen, #616
Wahl, Organic Dyestuffs, 299
Thorpe, Dic. Chemistry, 4, 386

Dyes Derived from Primuline-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	STILBENE DYE			
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Primuline-sulfonic Acid (2 mols) Dinitro-dibenzyl-disulfonic Acid *or* Dinitro-stilbene-disulfonic Acid	D
	PYRAZOLONE DYES			
25	Dianil Yellow 3G		[Ethyl aceto-acetate]	D
26	Dianil Yellow R		3-Methyl-1-phenyl-5-pyrazolone	D
27	Dianil Yellow 2R		3-Methyl-1-*p*-sulfophenyl-5-pyrazolone *or* Phenyl-hydrazine-*p*-sulfonic Acid [Ethyl aceto-acetate]	D
	MONOAZO DYES			
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	*m*-Phenylene-diamine	D
191	Pyramine Yellow R	I '14:— 5,727 I '20:— 100	Nitro-*m*-phenylene-diamine	D
192	Cotton Orange G	I '14:— 1,877	*m*-Phenylene-diamine-disulfonic Acid	D
195	Rosophenine SG	M '18:— ? M '19:— ? M '20:— 19,639	Nevile-Winther's Acid	D
197	Thiazine Red G	I '14:— 4,861 M '18:— ? M '19:— 11,886 M '20:— 13,988	Schaeffer's Acid	D

Dyes Derived from Primuline-sulfonic Acid (*continued*)

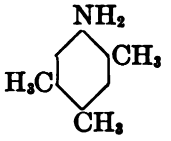
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
198	Clayton Yellow Thiazol Yellow	I '14:— 29,879 M '18:— ? M '19:— ? M '20:— ? I '20:— 11,182	Dehydrothio-*p*-toluidine-sulfonic Acid (2 mols) *or* Primuline (2 mols)	D
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 M '20:— ? I '20:— 125	Salicylic Acid	D
	DISAZO DYES			
209	Terra Cotta FC	I '14:— 551	*m*-Phenylene-diamine Naphthionic Acid	D
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	*m*-Phenylene-diamine-disulfonic Acid Metanilic Acid	D
	THIOBENZENYL DYES			
615	Thioflavine S	I '14:— 4,948 M '19:— ? M '20:— ? I '20:— 675	[Methylation]	D
616	Primuline	I '14:— 67,976 M '17:— 72,461 M '18:— 72,788 M '19:—271,338 M '20:—183,179 I '20:— 441		D

Pseudocumidine (*C. A. nomen.*)

ψ-Cumidine

2: 4: 5-Trimethyl-aniline

1: 2: 4-Trimethyl-5-amino-benzene



$=C_9H_{13}N = 135$

STATISTICS.—Imported '14:— 6,617 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:—28,405 lbs.

FORMATION.—Xylidine hydrochloride is digested with methanol (CH_3OH) in an autoclave at 280–300° and the product converted to nitrates and crystallized. The sparingly soluble nitrates are separated and washed, and treated with alkali to convert to bases, which are a mixture of xylidines and cumidines. The bases are then fractionally distilled, and that fraction coming over at 225–245° is allowed to crystallize and is pressed to remove oily products. It consists largely of pseudocumidine

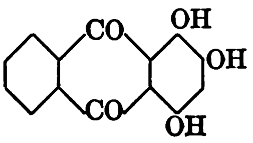
LITERATURE.—Thorpe, Dic. Chemistry, **2**, 177 (1912 Ed.); *or* **2**, 434 (1921 Ed.)
Lange, Zwischenprodukte, #1061

Dye Derived from Pseudocumidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
83	MONOAZO DYE Ponceau 4R	I '14:— 3,557 M '17:— ? M '18:— ? M '19:— 24,152 M '20:— ?	R Acid	A

Purpurin (*C. A. nomen.*)

1:2:4-Trihydroxy-anthraquinone



$=C_{14}H_8O_5=256$

FORMATION.—From alizarin by oxidation with manganese dioxide and sulfuric acid

LITERATURE.—Lange, Zwischenprodukte, #3129, 3271
Barnett, Anthracene and Anthraquinone

Dyes Derived from Purpurin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
783	Purpurin			M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	Aniline [Sulfonation]	M

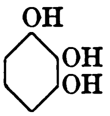
Pyrogallic Acid

See, Pyrogallol

Pyrogallol (*C. A. nomen.*)

1:2:3-Trihydroxy-benzene

Pyrogallic Acid



$= C_6H_6O_3 = 126$

STATISTICS.—Imported '14:—24,964 lbs.
Manufactured regularly, but amounts not disclosed

FORMATION.—From gallic acid by heating in an autoclave in presence of water

LITERATURE.—Lange, Zwischenprodukte, #958
Green, Organic Coloring Matters (1908), 45

Dyes Derived from Pyrogallol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
62	Azo Galleine		Dimethyl-*p*-phenylene-diamine	M
84	Azo Chromine		*p*-Amino-phenol	M
158	Chrome Brown RR	I '14:— 7,241 M '17:— ? I '20:— 2,183	4-Amino-1-phenol-2:6-disulfonic Acid	M
	XANTHONE DYES			
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 5,075 M '20:— ?	Phthalic Anhydride Pyrogallol (2 mols)	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Phthalic Anhydride Pyrogallol (2 mols) [Dehydration] *or* [Galleine dehydrated]	M
	ANTHRAQUINONE AND ALLIED DYES			
769	Alizarin Yellow C		[Acetic Acid]	M
770	Alizarin Yellow A		Benzoic Acid *or* Benzo trichloride	M
773	Anthracene Yellow	I '14:— 4,046	[Aceto-acetic Ethyl Ester; Bromination]	M

Pyrogallol-5-sulfonic Acid

3:4:5-Trihydroxy-*b*enzene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—1:3-Dichloro-2-hydroxy-benzene-5-sulfonic acid (as potassium salt) is fused with concentrated caustic potash solution at 150–160°

LITERATURE.—Lange, Zwischenprodukte, #959
Ger. Pat., 203,145; Frdl. 9, 247

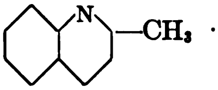
Dyes Derived from Pyrogallol-5-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
623	OXAZINE DYE Pyrogallol-cyanine-sulfonic Acid		Nitroso-dimethyl-aniline	M

Quinaldine (*C. A. nomen.*)

2-Methyl-quinoline

α-Methyl-quinoline



$= C_{10}H_9N = 143$

STATISTICS.—Manufactured '19:— ?
Manufactured '20:— ?

FORMATION.—By condensing aniline and paracetaldehyde either cold, or hot,—in the latter case using hydrochloric acid and aluminum or zinc chloride to catalyze the reaction

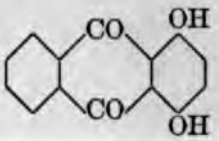
LITERATURE.—Cain, Intermediate Products (2d Ed.), 84
Lange, Zwischenprodukte, #2000–2002

Dyes Derived from Quinaldine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYES			
610	Quinoline Red		Benzo-trichloride Isoquinoline	B
612	Quinoline Yellow Spirit Soluble	I '14:— 79,553 I '20:— 205	Phthalic Anhydride	ss
613	Quinoline Yellow Water Soluble	I '14:— 15,354 I '20:— 34,440	Phthalic Anhydride [Sulfonation]	A

Quinizarin (*C. A. nomen.*)

1:4-Dihydroxy-anthraquinone



$=C_{14}H_8O_4=240$

FORMATION.—From anthraquinone by oxidation with sulfuric acid in presence of boric acid

LITERATURE.—Lange, Zwischenprodukte, #3233, 3260, 3268, 3270, 3274, 3276, 3314, 3351
Cain, Intermediate Products (2d Ed.), 255

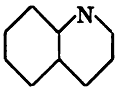
Dyes Derived from Quinizarin

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
852	Alizarin Irisol D		*p*-Toluidine [Sulfonation]	A
852	Alizarin Direct Violet R		4-Toluidine-3-sulfonic Acid	A

Dyes Derived from Quinizarin (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
865	Alizarin Cyanine Green E		*p*-Toluidine (2 mols) [Sulfonation]	ACr
865	Alizarin Direct Green G	I '14:— 2,000 I '20:— 31,851 M '20:— ?	4-Toluidine-3-sulfonic Acid (2 mols)	ACr

Quinoline



$= C_9H_7N = 129$

STATISTICS.—Imported '14:—very small
Manufactured '19:— ?

FORMATION.—(1) By extraction from coal-tar. (2) By synthesis through the heating together of aniline, nitro-benzene, glycerol and sulfuric acid for some time, first at 125° and then at 180°

LITERATURE.—Lange, Zwischenprodukte, #1995
Thorpe, Dic. Chemistry, **4**, 468

Dye Derived from Quinoline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	QUINOLINE DYE			
611	Quinoline Blue		Lepidine [Amyl iodide]	Photography

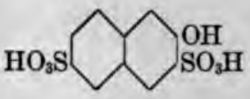
R Acid

2-Naphthol-3:6-disulfonic Acid (*C. A. nomen.*)

β-Naphthol-disulfonic Acid R

β-Naphthol-α-disulfonic Acid

Note.—R Acid is occasionally applied to other naphthalene derivatives, e.g., 2-amino-3-naphthol-6-sulfonic acid, 2-naphthylamine-3:6-disulfonic acid, 2:3-dihydroxy-naphthalene-6-sulfonic Acid



$= C_{10}H_8O_7S_2 = 304$

STATISTICS.—Imported '14:— 46,267 lbs.
Manufactured '18:— 712,033 lbs.
Manufactured '19:—1,008,007 lbs.
Manufactured '20:—1,250,674 lbs.

FORMATION.—From β-naphthol by disulfonation, and separation from the G acid simultaneously formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 226
Lange, Zwischenprodukte, #2651, 2652
Thorpe, Dic. Chemistry, 3, 626

Dyes Derived from R Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
39	Ponceau G	M '17:— ? M '19:— ?	Aniline	A
47	Orange III	M '18:— ?	β-Naphthol	A
65	Azo Coralline L	M '17:— ? M '18:— ? M '19:— ? I '20:— 249 M '20:— ?	*p*-Amino-acetanilide	A

Dyes Derived from R Acid *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
82	Ponceau R, 2R Scarlet R, 2R	I '14:— 35,259 M '17:—633,429 M '18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	Xylidine	A
83	Ponceau 4R	I '14:— 3,557 M '17:— ? M '18:— ? M '19:— 24,152 M '20:— ?	Pseudocumidine	A
101	Coccinine B		*m*-Amino-*p*-cresol Methyl Ether	A
112	Fast Red B Bordeaux B	I '14:— 25,821 M '17:—120,595 M '18:—200,415 M '19:—161,862 I '20:— 7,882 M '20:—217,406	*a*-Naphthylamine	A
168	Amaranth	I '14:— 86,067 M '17:— 66,069 M '18:— 73,539 M '19:—294,416 I '20:— 110 M '20:—204,958	Naphthionic Acid	A
202	Acid Alizarin Red B Palatine Chrome Red B	I '14:— 7,374 M '18:— ? M '19:— 28,081 I '20:— 1,342 M '20:— 67,817	Anthranilic Acid	ACr CL
	DISAZO DYES			
236	Cloth Red B Wool Red B	I '14:— 14,293 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	*o*-Amino-azo-toluene	A

Dyes Derived from R Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
238	Union Fast Claret		Amino-azo-xylene	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	Acetyl-*p*-phenylene-diamine α-Naphthylamine	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	1-Naphthylamine-4: 6- *and* -4: 7-disulfonic Acids α-Naphthylamine	A
270	Brilliant Croceine 9B		Amino-G Acid Aniline G Acid *or* R Acid	A
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	Amino-G Acid α-Naphthylamine	A
298	Milling Red R		Diamino-diphenyl-methane R Acid (2 mols)	A
299	Cinnabar Scarlet BF		Diamino-dixylyl-methane R Acid (2 mols)	CL
300	Cinnabar Scarlet G Cotton Ponceau		Diamino-dixylyl-phenyl-methane R Acid (2 mols)	CL
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Salicylic Acid	D
412	Congo Blue 2B		Dianisidine Nevile-Winther's Acid	D

Dyes Derived from R Acid (*continued*)

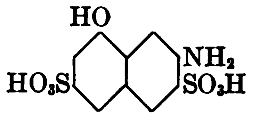
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
414	Indazurine B		Dianisidine 1:7-Dihydroxy-naphthalene-4-sulfonic Acid	D
429	Indazurine BB		Dianisidine 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid	D
433	Coomassie Black B		1:4-Naphthylene-diamine-2-sulfonic Acid β-Naphthylamine	A
434	Coomassie Navy Blue	I '20:— 42,357	1:4-Naphthylene-diamine-2-sulfonic Acid β-Naphthol	A
	TRISAZO DYE			
484	Milling Scarlet B		Diamino-azoxy-toluene Nevile-Winther's Acid	A

2R Acid

2-Amino-8-naphthol-3:6-disulfonic Acid

Amino-naphthol-disulfonic Acid RR *or* 2R

7-Amino-1-*n*aphthol-3:6-disulfonic Acid (*C. A. nomen.*)



$=C_{10}H_9NO_7S_2=319$

FORMATION.—From sodium 2-naphthylamine-3:6:8-trisulfonate by fusion with caustic soda at 220–260°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 239
Lange, Zwischenprodukte, #2734

Dyes Derived from 2R Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
44	Azo Archil R		Aniline	A
	TRISAZO DYES			
442	Direct Black V	I '14:—145,738	Benzidine α-Naphthylamine Gamma Acid	D
443	Direct Indone Blue R		Benzidine α-Naphthylamine H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine Salicylic Acid *m*-Phenylene-diamine	D
453	Columbia Black R	I '14:— 1,307	Tolidine *m*-Tolylene-diamine (2 mols)	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine Salicylic Acid *m*-Phenylene-diamine	D
455	Columbia Black B	I '14:—165,727	Dianisidine *m*-Tolylene-diamine (2 mols)	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	Dianisidine Salicylic Acid *m*-Phenylene-diamine	D

Red Acid

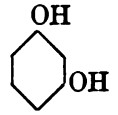
1:5-Dihydroxy-naphthalene-3:7-disulfonic Acid (*not considered herein*)

Resorcine

See, Resorcinol (*C. A. nomen.*)

Resorcinol (*C. A. nomen.*)

Resorcine



$= C_6H_6O_2 = 110$

STATISTICS.—Imported '14:— 61,624 lbs.
Manufactured '17:— ?
Manufactured '18:— 2,087 lbs.
Manufactured '19:— 96,397 lbs.
Manufactured '20:—139,315 lbs.

FORMATION.—Benzene is disulfonated with oleum, and the resulting benzene-*m*-disulfonic acid is fused with a large excess of caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 130

Dyes Derived from Resorcinol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	NITROSO DYE			
1	Solid Green O		[Dinitroso Derivative]	M
	STILBENE DYE			
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	*p*-Nitro-toluene-*o*-sulfonic Acid (4 mols) [Resorcinol as reducing agent]	D
	MONOAZO DYES			
35	Sudan G	I '14:— 798	Aniline	SS
60	Azo Phosphine GO	I '14:— 50	*m*-Amino-phenyl-trimethyl-ammonium Chloride	B
75	New Phosphine G	I '14:— 500	Amino-benzyl-dimethyl-amine	B

Dyes Derived from Resorcinol *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
143	Chrysoine Tropaeoline	I '14:— 6,252 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid	A
155	Acid Alizarin Garnet R	I '20:— 201 M '20:— ?	*o*-Amino-phenol-*p*-sulfonic Acid	M
	DISAZO DYES			
211	Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	*m*-Xylidine Sulfanilic Acid	A
213	Fast Brown	I '14:— 3,206 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid (2 mols)	A
222	Janus Yellow G	I '14:— 2,250 I '20:— 758	*m*-Nitro-aniline *m*-Amino-phenyl-tri-methyl-ammonium Chloride	B
317	Pyramidol Brown BG		Benzidine Resorcinol (2 mols)	D
374	Congo 4R Congo Red 4R	M '18:— ?	Tolidine Naphthionic Acid	D
376	Pyramidol Brown T		Tolidine Resorcinol (2 mols)	D
	TRISAZO DYES			
435	Janus Brown B		*p*-Amino-benzyl-diethyl-amine *α*-Naphthylamine	B

Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
437	Isodiphenyl Black R		*p*-Phenylene-diamine (2 mols) Gamma Acid	D
461	Coomassie Union Blacks		1:4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid Resorcinol (2 mols)	D
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Sulfanilic Acid Salicylic Acid	D
480	Congo Brown R	I '14:— 3,045	Benzidine Laurent's Acid Salicylic Acid	D
481	Azo Corinth		Tolidine Naphthionic Acid 3-Amino-phenol-4-sulfonic Acid	D
	TETRAKISAZO DYE			
489	Hessian Brown BBN		Benzidine Sulfanilic Acid (2 mols) Resorcinol (2 mols)	D
	XANTHONE DYES			
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? I '20:— 24,709 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Phosphorus pentachloride; diethylamine]	B
578	Rhodamine 12 GF		Dimethylamino-hydroxy-benzoyl-benzoic Acid [Formaldehyde; esterification]	B

Dyes Derived from Resorcinol *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES *(continued)*			
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	Phthalic Anhydride Resorcinol (2 mols) Aniline *or* *p*-toluidine (2 mols) [PCl_5; sulfonation]	A
582	Fast Acid VioletA2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) *o*-Toluidine (2 mols) [PCl_5; sulfonation]	A
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Phthalic Anhydride Resorcinol (2 mols) Mesidine (2 mols) [PCl_5; Sulfonation]	A
584	Fast Acid Blue R	I '14:— 4,022 I '20:— 130	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) *p*-Phenetidine (2 mols) [PCl_5; Sulfonation]	A
585	Uranine Fluoresceine	I '14:— 2,273 M '17:— ? M '19:— ? I '20:— 10	Phthalic Anhydride Resorcinol (2 mols)	A
586	Chrysoline	I '20:— 1,402	Phthalic Anhydride Resorcinol (2 mols) Benzyl Chloride	A
587	Eosine	I '14:— 94,528 M '17:— 68,496 M '18:—161,153 M '19:—121,303 I '20:— 296 M '20:— 85,489	Phthalic Anhydride Resorcinol (2 mols) [Bromination] *or* [Fluoresceine brominated]	A

Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
588	Eosine Spirit Soluble Methyl Eosine		Phthalic anhydride Resorcinol (2 mols) [Bromination, methylation] *or* [Eosine methyl ester]	ss
589	Eosine SP	I '14:— 2,315 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Bromination, ethylation] *or* [Eosine ethyl ester]	ss
590	Eosine BN Acid Eosine	I '14:— 20,143 I '20:— 1,132 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Bromination, nitration] *or* [Dibromo-fluoresceine dinitrated]	A
591	Erythrosine G	I '14:— 99	Phthalic Anhydride Resorcinol (2 mols) [Iodation] *or* [Fluoresceine iodated]	A
592	Erythrosine B	I '14:— 4,350 M '17:— 505 M '18:— 1,636 M '19:— ? I '20:— 9 M '20:— 6,874	Phthalic Anhydride Resorcinol (2 mols) [Iodation] *or* [Fluoresceine iodated]	A
593	Phloxine P	I '14:— 2,244 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Bromination]	

Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYES (*continued*)			
594	Cyanosine Spirit Soluble		3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Bromination, methylation] *or* [Phloxine methyl ester]	A
595	Rose Bengal	I '14:— 2,277 M '20:— ?	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Iodation]	A
596	Phloxine	I '14:— 1,020	Tetrachloro-phthalic Acid Resorcinol (2 mols) [Bromination]	A
597	Rose Bengal B	I '14:— 1,354 M '17:— ? M '18:— ? M '19:— ?	Tetrachloro-phthalic Acid Resorcinol (2 mols) [Iodation]	A
598	Cyanosine B		Tetrachloro-phthalic Acid Resorcinol (2 mols) [Ethylation] *or* [Phloxine ethylated]	SS
600	Coeruleine B	M '19:— ? M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Dehydration] [Fluoresceine dehydrated]	M
	OXAZINE DYES			
642	Phenocyanine TC	I '20:— 4,740	Nitroso-dimethyl-aniline Gallic Acid *or* [Gallocyanine]	M

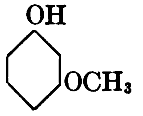
Dyes Derived from Resorcinol (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYES (*continued*)			
643	Phenocyanine T V	M '17 – I '20:— 1,543	Nitroso-dimethyl-aniline Gallic Acid [Sulfonation] *or* [Gallocyanine; Sulfonation]	M
644	Ultracyanine B		Nitroso-dimethyl-aniline Gallic Acid [Alkaline Condensation] *or* [Gallocyanine alkaline condensation with resorcinol]	M
647	Nitroso Blue MR Resorcine Blue		Nitroso-dimethyl-aniline	MF
648	Iris Blue		Nitroso-resorcinol [Bromination]	A

Resorcinol Methyl Ether

Methyl-resorcinol

m-Methoxy-*p*henol (*C. A. nomen.*)



$= C_7H_8O_2 = 124$

FORMATION.—From resorcinol by methylation

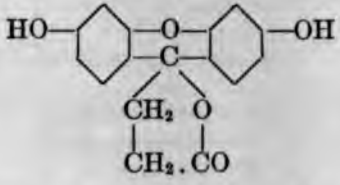
LITERATURE.—Ullmann, Enzy. tech. Chemie, **9**, 490

Dye Derived from Resorcinol Methyl Ether

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
575	XANTHONE DYE Rhodine 12 GM		Dimethylamino-hydroxy-benzoyl-benzoic Acid [Ethyl esterification]	B

Resorcinol-succinein

3:6-Dihydroxy-9-*x*anthene-propionic Acid; γ-Lactone (*C. A nomen.*)



$=C_{16}H_{12}O_5=284$

FORMATION.—From resorcinol and succinic acid (or its anhydride) by heating together at about 200° C.

LITERATURE.—Cohen, Theoretical Organic Chemistry (1918 Ed.), 461

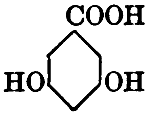
Dye Derived from Resorcinol-succinein

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
570	XANTHONE DYE Rhodamine S	I '14:— 600 I '20:— 273	[Dimethyl-amine 2 mols]	A

α-Resorcylic Acid (*C. A. nomen.*)

3:5-Dihydroxy-benzoic Acid

m-Dihydroxy-benzoic Acid



$=C_7H_6O_4=154$

FORMATION.—From 3: 5-disulfo-benzoic acid by caustic soda fusion

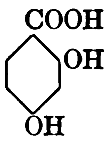
LITERATURE.—Lange, Zwischenprodukte, #881
Ullmann, Enzy. tech. Chemie, **2**, 345

Dye Derived from α-Resorcylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
771	Resoflavine W		α-Resorcylic Acid (2 mols) [Oxidation]	M

β-Resorcylic Acid (*C. A. nomen.*)

2: 4-Dihydroxy-benzoic Acid



$=C_7H_6O_4=154$

FORMATION.—By heating resorcinol with a solution of potassium bicarbonate under reflux

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 345
Bistrzycki and Kostanecki, Ber. **18**, 1984 (1885)

Dye Derived from β-Resorcylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYE			
49	Prague Alizarin Yellow G		*m*-Nitro-aniline	M

RG Acid

See, 1-Naphthol-3: 6-disulfonic Acid

Rho Acid

See, Anthraquinone-1: 5-disulfonic Acid

Rumpff Acid

See, Croceine Acid

S Acid

See, 1-Amino-8-naphthol-4-sulfonic Acid
See, 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid
See, 1-Naphthylamine-8-sulfonic Acid
See, 1-Naphthylamine-4: 8-disulfonic Acid
1-Naphthol-8-sulfonic Acid (*not considered herein*)
1: 8-Dihydroxy-naphthalene-2: 4-disulfonic Acid (*not considered herein*)
1: 7-Dihydroxy-naphthalene-6-carboxylic Acid (*not considered herein*)

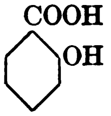
Note.—The use of S as a trivial name is very confusing and should be avoided

2S Acid

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

Salicylic Acid

o-Hydroxy-benzoic Acid



$= C_7H_6O_3 = 138$

	Technical lbs.	*U. S. P.* lbs.
STATISTICS.—Manufactured '17:—	960,339	2,495,285
Manufactured '18:—	1,395,630	3,270,462
Manufactured '19:—	3,467,055	2,619,726
Manufactured '20:—	3,914,163	2,663,494

FORMATION.—Phenol is treated with caustic soda, dried and powdered; and then subjected to action of carbon dioxide under pressure and at 100–145°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 149
Lange, Zwischenprodukte, #145, 471–475, 479

Dyes Derived from Salicylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
48	Alizarin Yellow GG	I '14:—144,761 M '17:— 1,452,622 M '18:— 2,233,208 M '19:—163,170 M '20:—211,580	*m*-Nitro-aniline	M
58	Alizarin Yellow R	I '14:— 97,059 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	*p*-Nitro-aniline *or* Aniline [with nitration after coupling]	M
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	*o*-Anisidine *or* *m*-Amino-*p*-cresol Methyl Ether	M
102	Diamond Flavine G	I '14:— 23,089 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine	M
103	Dutch Yellow		Benzidine [Sodium sulfite]	M
133	Eriochrome Phosphine R	I '14:— 1,433	*p*-Nitro-aniline-*o*-sulfonic Acid	ACr
177	Chrome Yellow D Mordant Yellow O	I '14:—129,651 M '17:— ? M '18:— 32,011 M '19:— ? I '20:— 1,389 M '20:— ?	Broenner's Acid	M

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
178	Crumpsall Yellow		Amino-G Acid	A
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 I '20:— 125 M '20:— ?	Dehydrothio-*p*-toluidine-sulfonic Acid *or* Primuline	D
204	Diamond Yellow G		*m*- *or* *p*-Amino-benzoic Acid	M
	DISAZO DYES			
221	Anthracene Acid Brown G	M '17:— ? M '18:— ? I '20:— 225	Sulfanilic Acid *p*-Nitro-aniline	ACr
250	Milling Orange	I '14:— 4,370	Amino-azo-benzene-sulfonic Acid	M
291	Azo Alizarin Bordeaux W		*p*-Phenylene-diamine Nevile-Winther's Acid	M
292	Azo Alizarin Black I		*p*-Phenylene-diamine Chromotropic Acid	M
294	Anthracene Yellow C Fast Mordant Yellow	I '14:— 3,678 I '20:— 887	Thio-aniline Salicylic Acid (2 mols)	A ACr
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	*p*-Amino-acetanilide (2 mols) Salicylic Acid (2 mols) Phosgene	D
305	Hessian Yellow		Diamino-stilbene-disulfonic Acid Salicylic Acid (2 mols)	D
339	Brilliant Orange G	I '14:— 6,321 M '17:— ?	Benzidine 3-Amino-phenol-4-sulfonic Acid	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Benzidine Naphthionic Acid	D
340	Chlorazol Orange 2R		Benzidine 2-Naphthylamine-7-sulfonic Acid	D
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine R Salt	D
342	Chrysamine G	I '14:— 608 M '17:— 26,061 M '18:— 28,846 M '19:— 54,279 I '20:— 9,810 M '20:— 49,342	Benzidine Salicylic Acid (2 mols)	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Benzidine Gamma Acid [Acid coupling]	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,959 M '20:—257,872	Benzidine Gamma Acid [Alkaline coupling]	D
345	Oxamine Maroon		Benzidine 1-Amino-5-naphthol-7-sulfonic Acid	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	Benzidine J Acid	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
347	Diphenyl Brown RN		Benzidine Methyl-gamma Acid	D
348	Diphenyl Brown BN	I '14:— 13,471	Benzidine Dimethyl-gamma Acid	D
349	Diamine Brown B	I '20:— 24	Benzidine Phenyl-gamma Acid	D
350	Alkali Yellow R		Benzidine Dehydrothio-*p*-toluidine-sulfonic Acid	D
355	Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	*o*-Nitro-benzidine Nevile-Winther's Acid	ACr
393	Diphenyl Brown 3GN	M '20:— ?	Tolidine Dimethyl-gamma Acid	D
394	Chrysamine R	I '14:— 6,261 M '20:— ?	Tolidine Salicylic Acid (2 mols)	D
404	Diamine Yellow N	M '17:— ? I '20:— 313	Ethoxy-benzidine Phenol [Ethylation]	D
	TRISAZO DYES			
444	Crumpsall Direct Fast Brown B		Benzidine Aniline Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Benzidine Aniline Phenyl-gamma Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine α-Naphthylamine H Acid	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
447	Benzo Gray S	I ’14:— 802	Benzidine α-Naphthylamine Nevile-Winther’s Acid	D
448	Diamine Bronze G	I ’14:— 4,495	Benzidine *m*-Phenylene-diamine H Acid	D
449	Trisulfon Brown B	I ’14:— 16,781 I ’20:— 38,616	Benzidine *m*-Phenylene-diamine 2R Acid	D
454	Trisulfon Brown G	I ’14:— 1,323	Tolidine *m*-Phenylene-diamine 2R Acid	D
457	Trisulfon Brown GG	I ’14:— 7,562 I ’20:— 38,411	Dianisidine *m*-Phenylene-diamine 2R Acid	D
465	Columbia Black Green D		Benzidine 1-Amino-8-naphthol-4-sulfonic Acid Aniline	D
466	Eboli Green		Benzidine Sulfanilic Acid 1-Amino-8-naphthol-3: 5-disulfonic Acid	D
468	Diphenyl Green 3G		Benzidine H Acid *o*-Chloro-*p*-nitro-aniline	D
475	Diamine Green G Oxamine Green G	I ’14:— 7,329 M ’17:— ? M ’18:— 29,118 M ’19:—136,638 I ’20:— 1,332 M ’20:— 52,292	Benzidine H Acid *p*-Nitro-aniline	D

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:—623,757	Benzidine Sulfanilic Acid *m*-Phenylene-diamine	D
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Sulfanilic Acid Resorcinol	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Sulfanilic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
480	Congo Brown R	I '14:— 3,045	Benzidine Laurent's Acid Resorcinol	D
482	Alizarin Yellow FS		Aniline *and* *o*-Toluidine *p*-Toluidine Salicylic Acid (3 mols) *or* [Fuchsine *and* Salicylic Acid]	M
	TRIPHENYL-METHANE DYES			
510	Azo Green		*m*-Amino-tetramethyl-*p*:*p*'-diamino-triphenyl-methane *or from* *m*-Nitro-benzaldehyde *and* dimethyl-aniline (2 mols) [Oxidation]	M

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
549	Chrome Violet	I '14:— 51	Hydrol [Oxidation]	M
557	Chrome Violet	I '14:— 220 M '18:— ?	Salicylic Acid (3 mols) [Formaldehyde *and* sulfuric Acid]	M

Schaeffer's α Acid

1-Naphthol-2-sulfonic Acid (*not considered herein*)

Schaeffer's Acid[1]

Schaeffer's β Acid

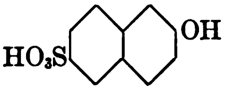
2-Naphthol-6-sulfonic Acid (*C. A. nomen.*)

β-Naphthol-sulfonic Acid S

β-Naphthol-sulfonic Acid Schaeffer

β-Naphthol-α-sulfonic Acid *of Armstrong and Schultz*

β-Naphthol-β-sulfonic Acid



$=C_{10}H_8O_4S=224$

STATISTICS.—Manufactured '17:—1,108,049 lbs.[2]
Manufactured '18:— 169,383 lbs.
Manufactured '19:— 146,111 lbs.
Manufactured '20:— 475,243 lbs.

FORMATION.—By sulfonation of β-naphthol, and separation from the Croceine acid formed simultaneously

---

[1] Schaeffer's Acid is very occasionally used when referring to 1-Naphthol-2-sulfonic acid, but this is more properly known as Schaeffer's α acid.

[2] Includes Croceine Acid.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 223
Lange, Zwischenprodukte, #2430–2432
Thorpe, Dic. Chemistry, **3**, 624

Dyes Derived from Schaeffer's Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
4	Naphthol Green	I '14:— 19,146 M '17:— 75,850 M '18:— 22,465 M '19:— 34,646 I '20:— 100 M '20:— ?	[Nitroso-Derivative]	A
37	Ponceau 4GB Croceine Orange	I '14:— 13,046 M '17:— ? M '18:— 30,824 M '19:— 17,274 M '20:— 96,573	Aniline	A
70	Brilliant Orange O	I '14:— 21,480 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Toluidine	A
79	Brilliant Orange R Xylidine Orange RR	I '14:— 4,204 M '17:— ? M '18:— 18,909 M '19:— ? M '20:— ?	Xylidine	A
111	Fast Red BT	M '17:— ? M '18:— ? M '19:— ?	α-Naphthylamine	A
123	Emine Red		Isodehydro-thio-*m*-xylidine	A
166	Fast Red E	I '14:— 2,473 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid	A

Dyes Derived from Schaeffer's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
196	Titian Red	I '14:— 886 M '19:— ? M '20:— ?	Dehydro-thio-*p*-toluidine-sulfonic Acid	D
197	Thiazine Red G	I '14:— 4,861 M '18:— ? M '19:— 11,886 M '20:— 13,988	Primuline	D
201	Pigment Scarlet G	M '17:— ? M '18:— ? M '19:— ?	Anthranilic Acid	CL
	DISAZO DYES			
234	Cloth Red G	I '14:— 554	*o*-Amino-azo-toluene	M
237	Bordeaux BX		Amino-azo-xylene	A
243	Coomassie Wool Black R		Acetyl-*p*-phenylene-diamine α-Naphthylamine	A
248	Fast Scarlet B	I '14:— 1,755	Amino-azo-benzene-sulfonic Acid	A
254	Bordeaux G		Amino-azo-toluene-sulfonic Acid	A
273	Diaminogene Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	Acetyl-1:4-naphthylene-diamine-6-sulfonic Acid α-Naphthylamine	D
289	Acid Alizarin Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M '19:— ?	2:6-Diamino-1-phenol-4-sulfonic Acid β-Naphthol	ACr
293	Milling Red G	I '14:— 699 I '20:— 200	Thioaniline Schaeffer's Acid (2 mols)	A

Dyes Derived from Schaeffer's Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	OXAZINE DYE			
645	Gallazine A		Nitroso-dimethyl-aniline Gallic Acid [Oxidation]	M

Schoellkopf's Acid

See, 1-Naphthol-4: 8-disulfonic Acid

1-Naphthylamine-4: 8-disulfonic Acid

1-Naphthylamine-8-sulfonic Acid

Also used for 1-Naphthol-8-sulfonic Acid, *which is not here indexed, but the intermediate generally referred to is that one listed first above*

Semi-naphthalidam

1: 5-Diamino-naphthalene (*not considered herein*)

Siver Salt (***Sodium derivative***)

See, Anthraquinone-2-sulfonic Acid

SS Acid *or* 2S Acid

See, 1-Amino-8-naphthol-2: 4-disulfonic Acid

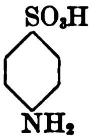
***m*-Sulfanilic Acid**

See, Metanilic Acid

Sulfanilic Acid (*C. A. nomen.* $SO_3H = 1$)

p-Amino-benzene-sulfonic acid

Aniline-*p*-sulfonic acid



$= C_6H_7NO_3S = 173$

Statistics.—Imported '14:— 4,477 lbs.
Manufactured '17:—1,184,412 lbs.
Manufactured '18:—1,247,478 lbs.
Manufactured '19:—1,023,861 lbs.
Manufactured '20:—1,796,838 lbs.

Formation.—From aniline by heating with sulfuric acid

Literature.—Cain, Intermediate Products (2d Ed.), 47
Lange, Zwischenprodukte, #615–620

Dyes Derived from Sulfanilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Pyrazolone Dyes			
22	Xylene Yellow 3G	I '14:— 23,074 I '20:— 77,782	1-(2:5-Dichloro-4-sulfophenyl)-3-methyl-5-pyrazolone	A
23	Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	*p*-Phenyl-hydrazine-sulfonic Acid	A
	Monoazo Dyes			
138	Helianthine Methyl Orange	I '14:— 500 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-aniline	A
139	Orange IV	I '14:— 19,020 M '19:— ? I '20:— 608	Diphenylamine	A
140	Azoflavine RS Curcumeine	I '14:— 39,869 I '20:— 5,225	Diphenylamine [Nitration]	A
141	Azo Yellow 3G	I '14:—114,689 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,818 M '20:— ?	Diphenylamine [Strong nitration]	A

Dyes Derived from Sulfanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
142	Brilliant Yellow S Curcumine	I '14:— 9,934	Diphenylamine [Sulfonation]	A
143	Chrysoine Tropoeoline	I '14:— 6,252 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol	A
144	Orange I	I '14:— 8,305 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,323 M '20:— 14,684	α-Naphthol	A
145	Orange II	I' 14:—128,877 M '17:—712,586 M '18:—916,890 M '19:— 1,133,925 I '20:— 2,265 M '20:— 1,850,341	β-Naphthol	A
146	Azo Fuchsine G	I '14:— 17,819 I '20:— 3,694	1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
147	Azo Fuchsine 6B	I '14:— 13,206 M '17:— ? M '18:— ?	1:8-Dihydroxy-naphthalene-4-sulfonic Acid [? Classification]	A
	DISAZO DYES			
211	Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	*m*-Xylidine Resorcinol	A

Dyes Derived from Sulfanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
212	Fast Brown G Acid Brown G	I '14:— 17,407 I '20:— 485	α-Naphthol Sulfanilic Acid (2 mols)	A
220	Palatine Black A Buffalo Black PY	I '14:—299,274 I '20:— 200	1-Amino-8-naphthol-4-sulfonic Acid α-Naphthylamine	A
221	Anthracene Acid Brown G	M'17:— ? M '18:— ? I '20:— 225	*p*-Nitro-aniline Salicylic Acid	ACr
259	Ponceau 10 RB	I '14:— 201	*o*-Anisidine Croceine Acid	A
260	Eriochrome Verdone A	I '14:— 882	*m*-Amino-*p*-cresol β-Naphthol	ACr
261	Buffalo Black 10B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	α-Naphthylamine H Acid	A
262	Victoria Black B	I '14:— 557	α-Naphthylamine 1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
	TRISAZO DYES			
466	Eboli Green		Benzidine Salicylic Acid 1-Amino-8-naphthol-3:5-disulfonic Acid	D
476	Benzamine Brown 3 GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:—623,757	Benzidine *m*-Phenylene-diamine Salicylic Acid	D

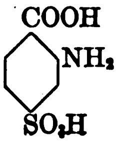
Dyes Derived from Sulfanilic Acid (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes (*continued*)			
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Resorcinol Salicylic Acid	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Salicylic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
	Tetrakisazo Dyes			
485	Benzo Brown G	I '14:— 41,905 M '17:— ? M '18:— ? M '19:— 83,506 I '20:— 2,286 M '20:—109,648	*m*-Phenylene-diamine (3 mols) Sulfanilic Acid (2 mols)	D
489	Hessian Brown BBN		Benzidine Resorcinol (2 mols) Sulfanilic Acid (2 mols)	D
	Sulfur Dye			
738	Cotton Black		1-Chloro-2:4-dinitro-benzene [S plus Na_2S]	S

***p*-Sulfo-anthranilic Acid** (*C. A. nomen.*)

2-Amino-4-sulfo-benzoic Acid

o-Amino-*p*-sulfo-benzoic Acid



$= C_7H_7NO_5S = 217$

FORMATION.—*o*-Nitro-toluene is sulphonated with oleum. The resulting *o*-nitro-toluene-*p*-sulfonic acid is converted into the sodium salt and heated with a 40 per cent caustic soda solution at 90–95°

LITERATURE.—Lange, Zwischenprodukte, #855

Dye Derived from *p*-Sulfo-anthranilic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
28	PYRAZOLONE DYE Pigment Fast Yellow G	M '19:— ? I '20:— 170	3-Methyl-1-phenyl-5-pyrazolone	CL

Sulfo-naphthalic Acid

Naphthalene-1-sulfonic Acid (*not considered herein*)

β-Sulfonic Acid

See, Anthraquinone-2-sulfonic Acid

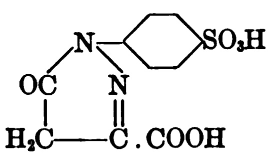
1-(*p*-Sulfo-phenyl)-3-methyl-5-pyrazolone

See, 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Tartrazinogen-sulfonic Acid

5-Keto-1-(*p*-sulfo-phenyl)-3-Δ^2-*p*yrazoline-carboxylic Acid (*C. A. nomen.*)



$= C_{10}H_8N_2O_6S = 284$

FORMATION.—By condensation of phenyl-hydrazine-*p*-sulfonic acid and ethyl oxalacetate

LITERATURE.—Cain, Intermediate Products (2d Ed.),168
Lange, Zwischenprodukte, #138

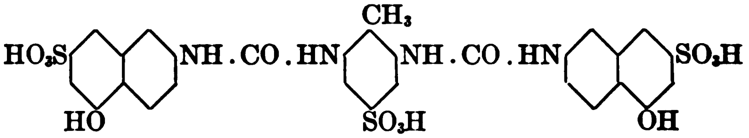
Dye Derived from 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
20	PYRAZOLONE DYE Flavazine S	I '14:— 81,375 I '20:— 1,500	Aniline	A

Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)

Sulfo-*m*-tolylene-diamine-dicarbonyl-dihydroxy-dinaphthylamine-disulfonic Acid

3:5-Bis[β-(5-hydroxy-7-sulfo-2-naphthyl)-carbamido]-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



$= C_{29}H_{24}N_4O_{13}S_3 = 732$

FORMATION.—By condensation of tolylene-diamine-sulfonic acid ($CH_3 : NH_2 : NH_2 : SO_3H = 1:2:6:4$) with two molecules of J acid (2-amino-5-naphthol-7-sulfonic acid), by means of phosgene ($COCl_2$)

LITERATURE.—Ger. Pat. 236,594, Frdl. 10, 904
Lange, Zwischenprodukte, #2912

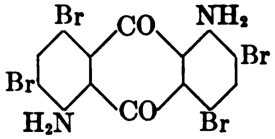
Dyes Derived from Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
280	Azidine Fast Scarlet GGS		*o*-Toluidine (2 mols)	D
281	Azidine Fast Scarlet 4BS		*o*-Toluidine *β*-Naphthylamine	D
282	Azidine Fast Scarlet 7BS		*β*-Naphthylamine (2 mols)	D

Tartrazinogen-sulfonic Acid

See, 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

2:4:6:8-Tetrabromo-1:5-diamino-anthraquinone



$=C_{14}H_6Br_4N_2O_2=554$

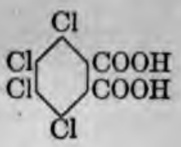
FORMATION.—By bromination of 1:5-diamino-anthraquinone

LITERATURE.—Scholl and Berblinger, Ber. **37**, 4180 (1904)
Barnett, Anthracene and Anthraquinone, 229
Cf. Lange, Zwischenprodukte, #3231, 3404, 3405

Dye Derived from 2:4:6:8-Tetrabromo-1:5-diamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
861	Anthraquinone Blue SR	I '20:— 917	Aniline (2 mols) [Sulfonation]	ACr

Tetrachloro-phthalic Acid



$=C_8H_2Cl_4O_4=302$

Statistics.—Imported '14:—1,102 lbs.

Formation.—Phthalic anhydride is warmed for some hours at 200° with 6 parts of antimony pentachloride, and chlorine is conducted through the molten mass for from 8 to 12 hours

Literature.—Lange, Zwischenprodukte, #1184

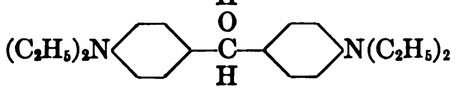
Dyes Derived from Tetrachloro-phthalic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Xanthone Dyes			
596	Phloxine	I '14:— 1,020	Resorcinol (2 mols) [Bromination]	A
597	Rose Bengal B	I '14:— 1,354 M '17:— ? M '18:— ? M '19:— ?	Resorcinol (2 mols) [Iodation]	A
598	Cyanosine B		Resorcinol (2 mols) [Bromination; Ethylation] *or* [Phloxine ethylated]	ss

p: p'-Tetraethyl-diamino-benzohydrol

p: p'-Tetraethyl-diamino-diphenyl-carbinol

p: p'-Bis(diethylamino)-benzohydrol (*C. A. nomen.*)



$=C_{21}H_{30}N_2O=326$

FORMATION.—Diethyl-aniline is condensed with formaldehyde in the presence of hydrochloric acid to tetraethyl-diamino-diphenylmethane. This body is now oxidized to the hydrol with lead peroxide

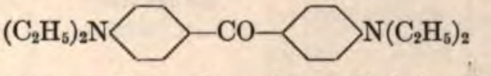
LITERATURE.—Lange, Zwischenprodukte, #1354

Dye Derived from *p*: *p*′-Tetraethyl-diamino-benzohydrol

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	*p*-Nitro-toluene [Oxidation]	B

p: p'-Tetraethyl-diamino-benzophenone

p: p'-Bis(diethylamino)-benzophenone (*C. A. nomen.*)



$=C_{21}H_{28}N_2O=324$

FORMATION.—By condensation of diethyl-aniline (2 mols) and phosgene (carbonyl chloride)

LITERATURE.—Lange, Zwischenprodukte, #1382

Dyes Derived from *p*: *p*′-Tetraethyl-diamino-benzophenone

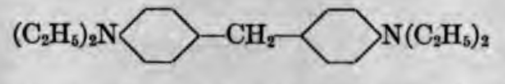
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES			
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline	B
532	Alkali Violet 6B	I '14:— 3,020	Methyl-diphenyl-amine [Sulfonation]	A
	DIPHENYL-NAPHTHYL-METHANE DYE			
560	Night Blue	I '14:— 361 M '19:— ? I '20:— 11	*p*-Tolyl-α-naphthyl-amine	B

p: p′-Tetraethyl-diamino-diphenyl-carbinol

See, p: p′-Tetraethyl-diamino-benzohydrol

p: p′-Tetraethyl-diamino-diphenyl-methane

p: p′-Methylene-bis-[N: N-diethyl-aniline] (*C. A. nomen.*)



$=C_{21}H_{30}N_2=310$

FORMATION.—By condensation of diethyl-aniline with formaldehyde in the presence of hydrochloric acid

LITERATURE.—*Cf.* Cain, Intermediate Products (2d Ed.), 102
Cf. Lange, Zwischenprodukte, #1301

Dye Derived from p: p′-Tetraethyl-diamino-diphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
518	TRIPHENYL-METHANE DYE Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline	B

1: 3: 5: 7-Tetrahydroxy-anthraquinone

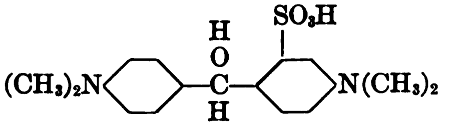
See, Anthrachrysone

Tetramethyl-diamino-benzohydrol

See, Hydrol

p: p′-Tetramethyl-diamino-benzohydrol-sulfonic Acid

5-Dimethylamino-α-(p-dimethylamino-phenyl)-α-hydroxy-o-toluene-sulfonic Acid (*C. A. nomen.*)



$=C_{17}H_{22}N_2O_4S=350$

FORMATION.—Tetramethyl-diamino-diphenyl-methane (from condensation of dimethyl-aniline and formaldehyde) is dissolved in monohydrate and sulfonated with 25 per cent oleum at 110°. This methane-sulfonic acid is now oxidized with lead peroxide to the hydrol derivative

LITERATURE.—Ger. Pat. 88085; Frdl. **4**, 219
Cain, Intermediate Products (2d Ed.), 102
Lange, Zwischenprodukte, #1312
Georgievics and Grandmougin, Dye Chemistry, 208

Dye Derived from Tetramethyl-diamino-benzohydrol-sulfonic Acid

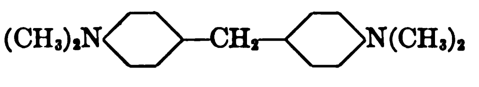
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
531	TRIPHENYL-METHANE DYE Eriocyanine A	I '14:— 25,091 I '20:— 8,223 M '20:— ?	Dibenzyl-aniline-sulfonic [or disulfonic] Acid [Oxidation]	A

Tetramethyl-diamino-benzophenone

See, Ketone

p: *p'*-Tetramethyl-diamino-diphenyl-methane

p: *p'*-Methylene-bis-[*N*: *N*-dimethyl-aniline] (*C. A. nomen.*)


$= C_{17}H_{22}N_2 = 254$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From dimethyl-aniline (2 mols) by condensing with formaldehyde in the presence of hydrochloric acid

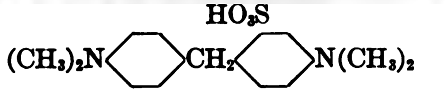
LITERATURE.—Cain, Intermediate Products (2d Ed.), 102
Lange, Zwischenprodukte, #1301

Dyes Derived from *p*: *p*'-Tetramethyl-diamino-diphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AURAMINES			
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	[Sulfur and ammonia]	B
	ACRIDINE DYE			
603	Acridine Orange NO	I '14:— 2,336 I '20:— 1,925	[Dinitration, Reduction] [Ammonia Removal, Oxidation]	B

p: *p*'-Tetramethyl-diamino-diphenylmethane-sulfonic Acid

6-(*p*-Dimethylamino-benzyl)-*N*:*N*-dimethyl-*m*etanilic Acid (*C.A. nomen.*)



$= C_{17}H_{22}N_2O_3S = 334$

FORMATION.—By sulfonation of tetramethyl-diamino-diphenylmethane; or by condensation of dimethyl-metanilic acid and dimethyl-aniline with formaldehyde

LITERATURE.—Lange, Zwischenprodukte, #1312
Cain, Intermediate Products (2d Ed.), 102
Georgievics and Grandmougin, Dye Chemistry, 208

USES.—For preparation of *p*:*p*'-tetramethyl-diamino-benzohydrol-sulfonic acid

***N*':*N*':*N*'':*N*''-Tetramethyl-*m*:*p*':*p*''-methenyl-trisaniline** (*C.A. nomen.*)

See, *m*-Amino-tetramethyl-*p*':*p*''-diamino-triphenyl-methane

α-Tetranitro-naphthalene

From 1: 5-Dinitro-naphthalene

β-Tetranitro-naphthalene

1: 3: 6: 8-Tetranitro-naphthalene (*not considered herein*)

γ-Tetranitro-naphthalene

1: 3: 5: 8-Tetranitro-naphthalene (*not considered herein*)

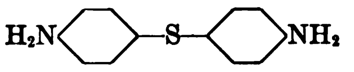
δ-Tetranitro-naphthalene

1: 2: 5: 8-Tetranitro-naphthalene (*not considered herein*)

Thioaniline

p: *p*′-Thio-bisaniline (*C. A. nomen.*)

p: *p*′-Diamino-diphenyl-sulfide



$=C_{12}H_{12}N_2S=216$

FORMATION.—From aniline by heating with sulfur in presence of lead oxide

LITERATURE.—Meyer-Jacobson, Organische Chemie (1902), II, **1**, 476

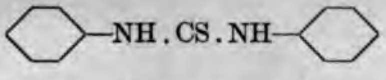
Dyes Derived from Thioaniline

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
293	Milling Red G	I '14:— 699 I '20:— 200	Schaeffer's Acid (2 mols)	A
294	Anthracene Yellow C Fast Mordant Yellow	I '14:— 3,678 I '20:— 887	Salicylic Acid (2 mols)	A ACr

***p*: *p*′-Thio-bisaniline** (*C. A. nomen.*)

See, Thioaniline

Thio-carbanilide (*C. A. nomen.*)
Diphenyl-thiourea



$=C_{13}H_{12}N_2S=228$

STATISTICS.—Manufactured '17:— ?
Manufactured '18:—1,326,236 lbs.
Manufactured '19:—2,268,375 lbs.
Manufactured '20:—2,226,807 lbs.

FORMATION.—From aniline by action of carbon disulfide

LITERATURE.—Ullmann, Enzy. tech. Chemie, **6**, 304

Dyes Derived from Thio-carbanilide

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
874	Indigo	I '14:—8,507,359 M '17:—274,771 M '18:—3,083,888 M '19:—8,863,824 I '20:—520,347 M '20:—18,178,231	Thio-carbanilide (2 mols) [KCN, etc.]	V
876	Indigo MLB Indigo White		Thio-carbanilide (2 mols) [KCN, etc.; Reduction] *or* [Indigo Reduced]	V
877	Indigotine	I '14:— 19,329 M '17:—1,876,787 M '18:—1,434,703 M '19:—1,699,670 I '20:— 5,512 M '20:—1,395,000	Thio-carbanilide (2 mols), etc. *or* [Indigo Sulfonated]	A

Dyes Derived from Thio-carbanilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
878	Indigotine P		Thio-carbanilide (2 mols), etc. *or* [Indigo Sulfonated]	A
879	Brom Indigo Rathjen	I '14:— 53,610 M '20:— ?	Thio-carbanilide (2 mols), etc. *or* [Indigo Brominated]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Thio-carbanilide (2 mols), etc. *or* [Indigo, Brominated]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Thio-carbanilide (2 mols), etc. *or* [Indigo, Chlorinated Brominated]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Thio-carbanilide (2 mols), etc. *or* [Indigo Chlorinated]	V

Dyes Derived from Thio-carbanilide (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES (*continued*)			
886	Brilliant Indigo BASF/G	I '14:— 12,057	Thio-carbanilide (2 mols), etc. *or* [Indigo Chlorinated, Brominated]	V
889	Indigo Yellow 3G		Thio-carbanilide (2 mols), etc. Benzoyl Chloride *or* [Indigo, Benzoyl Chloride]	V
890	Ciba Yellow G	I '14:— 48	Thio-carbanilide (2 mols), etc. Benzoyl Chloride [Bromination] *or* [Indigo Yellow 3G, Brominated]	V

Thio-indoxyl

See, 2-Hydroxy-thionaphthene

Thio-indoxyl-carboxylic Acid

See, 2-Hydroxy-thionaphthene-1-carboxylic Acid

***o*-Thiol-benzoic Acid**

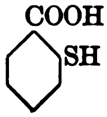
See, Thio-salicylic Acid

Thio-salicylic Acid

o-Mercapto-*b*enzoic Acid (*C. A. nomen.*)

o-Thiol-benzoic Acid

Thiophenol-*o*-carboxylic Acid



$= C_7H_6O_2S = 154$

FORMATION.—(1) From *o*-chloro-benzoic acid by reaction with potassium hydrogen sulfide. (2) From anthranilic acid by diazotizing and then running into a solution of sodium polysulfide and sodium hydroxide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 151
Lange, Zwischenprodukte, #507–510

Dyes Derived from Thio-salicylic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	INDIGO GROUP DYES			
912	Thio Indigo Red B	I '14:— 1,102 I '20:— 275	Thio-salicylic Acid (2 mols) [Chloro-acetic Acid 2 mols; etc.]	V
919	Ciba Bordeaux B	I '14:— 899 I '20:— 1,786	Thio-salicylic Acid (2 mols) [Chloro-acetic Acid 2 mols; etc.; Bromination] *or* [Thio Indigo Red, brominated]	V

Tobias Acid

See, 2-Naphthylamine-1-sulfonic Acid

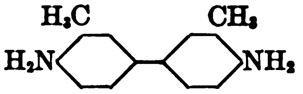
Also applied to, 2-Naphthol-1-sulfonic Acid

Tolidine

See, o-Tolidine

***o*-Tolidine** (*C. A. nomen.*)

Tolidine



$=C_{14}H_{16}N_2=212$

STATISTICS.—Imported '14:— 5,874 lbs.
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—143,012 lbs.
Manufactured '20:—375,905 lbs.

FORMATION.—From *o*-nitro-toluene by reduction with zinc dust and hydrochloric acid, and conversion of the hydrazo-toluene into tolidine by boiling with hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 95
Lange, Zwischenprodukte, #1204, 1216

Dyes Derived from *o*-Tolidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
338	Naphthamine Blue 3B	I '14:— 11,707 I '20:— 400	K Acid (2 mols)	D
362	Toluylene Orange R Oxy Diamine Orange	I '14:— 25,908 M '19:— ? I '20:— 1,653	4:6-Diamino-*m*-toluene-sulfonic Acid (2 mols)	D
363	Benzopurpurin 4B	I '14:—351,712 M '17:— ? M '18:—356,522 M '19:—288,021 I '20:— 3,492 M '20:—617,629	Naphthionic Acid (2 mols)	D
364	Benzo Purpurin 6B	I '14:— 9,171 I '20:— 4,743	Laurent's Acid (2 mols)	D
365	Benzopurpurin B	I '14:— 21,090 M '17:— ? M '18:— ? M '19:— ?	Broenner's Acid (2 mols)	D
366	Diamine Red B Deltapurpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	2-Naphthylamine-7-sulfonic Acid Broenner's Acid	D

Dyes Derived from *o*-Tolidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dyes (*continued*)			
367	Diamine Red 3B Deltapurpurin 7B		2-Naphthylamine-7-sulfonic Acid (2 mols)	D
368	Brilliant Purpurin 4B	I' 14:— 6,634	Naphthionic Acid Broenner's Acid	D
369	Brilliant Purpurin R	I '14:— 8,051	Amino-R Acid Naphthionic Acid	D
370	Brilliant Congo R	I '14:— 19,133 I '20:— 11,129	Amino-R Acid Broenner's Acid	D
371	Rosazurine G		Ethyl-2-naphthylamine-7-sulfonic Acid 2-Naphthylamine-7-sulfonic Acid	D
372	Rosazurine B		Ethyl-2-naphthylamine-7-sulfonic Acid (2 mols)	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Amino-R Acid Phenol [Ethylation]	D
374	Congo 4R Congo Red 4R	M '18:— ?	Naphthionic Acid Resorcinol	D
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Naphthionic Acid Nevile-Winther's Acid	D
376	Pyramidol Brown T		Resorcinol (2 mols)	D
377	Azo Blue	I '14:— 198 M '19:— ? M '20:— ?	Nevile-Winther's Acid (2 mols)	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	1-Naphthol-3:6:8-trisulfonic Acid β-Naphthol	D

Dyes Derived from *o*-Tolidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Chromotropic Acid Nevile-Winther's Acid	D
380	Dianil Blue B		Chromotropic Acid (2 mols)	D
381	Azo Black Blue B, R		H Acid *m*-Hydroxy-diphenylamine	D
382	Azo Mauve B	M '17:— ? M '20:— ?	H Acid α-Naphthylamine	D
383	Naphthazurine B	I '14:— 4,782	H Acid β-Naphthylamine	D
384	Chicago Blue 2R Diamine Blue C2R	I '14:— 23,877	Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	J Acid Nevile-Winther's Acid	D
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Nevile-Winther's Acid H Acid	D
387	Columbia Blue G	I '14:— 7,094	1-Naphthol-3: 8-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
388	Chicago Blue R		1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D

Dyes Derived from *o*-Tolidine (*continued*)

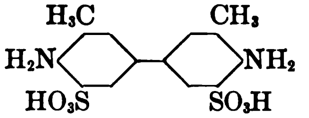
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
389	Eboli Blue B		1-Amino-8-naphthol-3:5-disulfonic Acid (2 mols)	D
390	Benzo Cyanine B	I '14:— 201	H Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
391	Diamine Blue 3B Benzo Blue 3B	I '14:— 1,365 M '17:— 14,533 M '18:— 99,645 M '19:—182,946 I '20:— 1,120 M '20:—136,891	H Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? I '20:— 273 M '20:— ?	4:6-Diamino-*m*-toluene-sulfonic Acid *o*-Cresotic Acid	D
393	Diphenyl Brown 3GN	M '20:— ?	Salicylic Acid Dimethyl-gamma Acid	D
394	Chrysamine R	I '14:— 6,261 M '20:— ?	Salicylic Acid (2 mols)	D
395	Cresotine Yellow R		*o*-Cresotic Acid (2 mols)	D
396	Indazurine RM		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid Nevile-Winther's Acid	D
397	Direct Blue R	M '17:— ?	1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid Nevile-Winther's Acid	D
398	Direct Gray B		1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D

Dyes Derived from *o*-Tolidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES (*continued*)			
399	Indazurine GS		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid Gamma Acid	D
	TRISAZO DYES			
450	Benzo Black Blue R		*a*-Naphthylamine Nevile-Winther's Acid (2 mols)	D
451	Congo Fast Blue R	I '14:— 4,449 M '19:— ? I '20:— 723	*a*-Naphthylamine 1-Naphthol-3:8-disulfonic Acid (2 mols)	D
452	Benzo Indigo Blue		*a*-Naphthylamine 1:8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
453	Columbia Black R	I '14:— 1,307	2 R Acid *m*-Tolylene-diamine (2 mols)	D
454	Trisulfon Brown G	I '14:— 1,323	2 R Acid Salicylic Acid *m*-Phenylene-diamine	D
481	Azo Corinth		Naphthionic Acid Resorcinol 3-Amino-1-phenol-4-sulfonic Acid	D

o-Tolidine-disulfonic Acid

2:2′-Diamino-5:5′-bi-*m*-*t*oluene-sulfonic Acid (*C. A. nomen.*)



$= C_{14}H_{16}N_2O_6S_2 = 372$

FORMATION.—From tolidine sulfate by heating with 2 parts of sulfuric acid at 210° from 36 to 48 hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96
Lange, Zwischenprodukte, #1269–1271

Dye Derived from o-Tolidine-disulfonic Acid

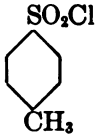
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
400	Milling Scarlet 4R Acid Anthracene Red 3B	I '14:— 18,330 I '20:— 2,336	β-Naphthol (2 mols)	A

p-Toluene-sulfochloride

See, p-Toluene-sulfonyl Chloride (*C. A. nomen.*)

p-Toluene-sulfonyl Chloride (*C. A. nomen.*)

p-Toluene-sulfochloride



$= C_7H_7ClO_2S = 190.5$

STATISTICS.—Imports '14:—small amount
Manufactured '17:— ?
Manufactured '18:— ?
Manufactured '19:—58,932 lbs.
Manufactured '20:— ?

FORMATION.—Toluene is sulfonated with oleum giving a mixture of *o- and* p-toluene-sulfonic acids, which are converted to sodium salts and dried, and then treated with PCl_3+Cl, resulting in *o- and* p-toluene-sulfonyl chlorides. The $POCl_3$ formed is first distilled off and then the mass cooled, whereupon the p-toluene-sulfonyl chloride crystallizes out

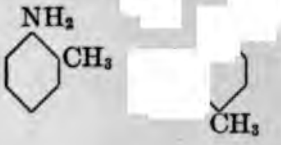
LITERATURE.—Thorpe, Dic. Chemistry, 4, 606
Biel., II, 132

Dye Derived from *p*-Toluene-sulfonyl Chloride

Dye	*inary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
182	MONOAZO DYE Fast Sulfon Violet Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	H Acid Aniline	A

Tolui

Mixed



$=C_7H_9N=107$

STATISTICS.—Imported '14:— 108,835 lbs.
Manufactured '17:—1,366,321 lbs.
Manufactured '18:— 308,667 lbs.
Manufactured '19:— 806,210 lbs.
Manufactured '20:—1,145,361 lbs.

FORMATION.—Toluene is nitrated using mixed acid, and the mixture of *o- and p*-nitro-toluenes is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 57
Lange, Zwischenprodukte, #234–240

Dyes Derived from Toluidines, *mixed*

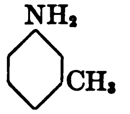
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
21	PYRAZOLONE DYE Pigment Chrome Yellow L		3-Methyl-1-phenyl-5-pyrazolone	CL

Dyes Derived from Toluidines, *mixed* (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
70	Brilliant Orange O	I '14:— 21,480 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Schaeffer's Acid	A
71	Azo Fuchsine B		1:8-Dihydroxy-naphthalene-4-sulfonic Acid	A
	Azine Dye			
688	Rosolane Mauve	I '14:— 796 I '20:— 3	Aniline Toluidines (3 mols)	B

m-Toluidine

Note.—C. A. numbering begins with NH_2, while German and English numbering generally start from CH_3



$= C_7H_9N = 107$

Statistics.—Imported '14:—945 lbs.
Manufactured '20:— ?

Formation.—*m*-Nitro-benzaldehyde is chlorinated to *m*-nitro-benzylidine chloride ($C_6H_4 . NO_2 . CHCl_2$), which by reduction with zinc at low temperatures, forms *m*-toluidine

Literature.—Ber. **13**, 677; **15**, 2011; **18**, 3398

Dyes Derived from *m*-Toluidine

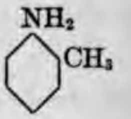
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Disazo Dye			
240	Janus Red B	I '14:— 250 I '20:— 176	*m*-Amino-phenyl-tri-methyl-ammonium Chloride *β*-Naphthol	B

Dyes Derived from *m*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
435	Janus Brown B		*m*-Amino-phenyl-trimethyl-ammonium Chloride Aniline *m*-Phenylene-diamine	B

o-Toluidine

Note.—C. A. numbering begins with NH_2*, while German and English numbering generally starts from* CH_3



$=C_7H_9N=107$

STATISTICS.—Imported '14:— 656,320 lbs.
Manufactured '17:— 336,985 lbs.
Manufactured '18:— 638,874 lbs.
Manufactured '19:—1,002,982 lbs.
Manufactured '20:—1,302,097 lbs.

FORMATION.—Toluene is nitrated to a mixture of *o- and p*-nitro-toluenes, which are separated. The *o*-nitro-toluene is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 57
Lange, Zwischenprodukte, §234–240

Dyes Derived from *o*-Toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
68	Spirit Yellow R	M '19:— ? M '20:— ?	*o*-Toluidine (2 mols)	ss
69	Chrysoidine R		*m*-Tolylene-diamine	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
124	Diazine Green S	I '14:— 1,340	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* Phenol	B
126	Indoine Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* β-Naphthol	B
127	Methyl Indoine B	M '17:— ?	*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] *with* "Amino-naphthols"	B
128	Janus Gray B		*p*-Tolylene-diamine Aniline *or* 2d mol *o*-Toluidine [Preceding used as Safranine] [Other intermediate unknown]	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYES			
280	Azidine Fast Scarlet GGS		*o*-Toluidine (2 mols) Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
281	Azidine Fast Scarlet 4BS		β-Naphthylamine Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic acid)	D
	TRISAZO DYE			
482	Alizarin Yellow FS		Aniline *and* *p*-Toluidine [as Fuchsine] Salicylic Acid (3 mols)	M
	TRIPHENYL-METHANE DYES			
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M' 19:—155,830 I '20:— 189 M '20:—284,285	Aniline *p*-Toluidine [Arsenic Acid *or* Nitro-benzene]	B
513	New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	Anhydro-formaldehyde-*o*-toluidine *or* Diamino-*o*-ditolyl-methane [*o*-Nitro-toluene, etc.]	B
514	Red Violet 5R	I '14:— 331 I '20:— 750	Aniline *p*-Toluidine [Nitro-benzene, etc., *or* Arsenic Acid] [Methylation *or* ethylation] *or* [Magenta methylated *or* ethylated]	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (3–4 mols) *p*-Toluidine [Benzoic Acid] *or* [Magenta phenylated]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	Aniline *p*-Toluidine [Sulfonation] *or* [Magenta sulfonated]	A
525	Red Violet 5RS		Aniline *p*-Toluidine, etc. [Ethylation Sulfonation] *or* [Red Violet 5R, sulfonated]	A
526	Acid Violet 4RS		Aniline *p*-Toluidine [Dimethylation, Trisulfonation] *or* [Magenta dimethylated, trisulfonated]	A
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	*p*-Toluidine Aniline (3–4 mols) [Sulfonation] *or* [Spirit Blue sulfonated]	A

Dyes Derived from *o*-Toluidine (*continued*)

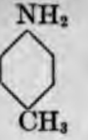
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
537	Methyl Blue for Silk Marine Blue	I ’14:— 34,867 M ’18:— ? M ’19:— ? I ’20:— 2,395 M ’20:— ?	Aniline (4 mols) *p*-Toluidine [Sulfonation]	A
538	Methyl Blue Cotton Blue	I ’14:— 50,255	Aniline (4 mols) *p*-Toluidine [Di- *and* trisulfonation]	B
539	Water Blue Soluble Blue	I ’14:— 91,152 M ’18:— ? M ’19:— 16,315 I ’20:— 1,387 M ’20:— 98,770	*p*-Toluidine Aniline (3–4 mols) [Di- *and* tri-sulfonation] *or* [Spirit Blue di- *and* tri-sulfonated]	A
540	Pacific Blue		Aniline *p*-Toluidine Diamino-diphenyl-methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		*β*-Naphthylamine (3 mols) Aniline *p*-Toluidine [Disulfonation]	B
	XANTHONE DYE			
582	Fast Acid Violet A2R	I ’14:— 875 I ’20:— 2,679 M ’20:— ?	Phthalic Anhydride Resorcinol (2 mols) *o*-Toluidine (2 mols) [PCl_5, Sulfonation]	A
	ACRIDINE DYE			
606	Phosphine	I ’14:—168,175 M ’17:— ? M ’18:— ? M ’19:— 14,648 I ’20:— 19,259 M ’20:— ?	*p*-Toluidine Aniline [Magenta by-product]	B

Dyes Derived from *o*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	AZINE DYES			
679	Safranine	I '14:— 59,921 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	*p*-Tolylene-diamine Aniline *or* *o*-Toluidine (extra mol)	B
683	Salfranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-*p*-phenylene-diamine Aniline [Oxidation]	B
687	Rosolane O	I '20:— 1,083	*o*-Amino-diphenylamine Aniline [Oxidation]	B
702	Para Blue		Aniline (3–4 mols) *p*-Toluidine *p*-Phenylene-diamine *or* [Spirit Blue, *p*-Phenylene-diamine]	B
703	Rubramine		Nitroso-dimethyl-aniline *p*-Toluidine	B
704	Indamine 3R		Nitroso-dimethyl-aniline	B
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	Nitroso-dimethyl-aniline *p*-Toluidine	B
	SULFUR DYE			
733	Immedial Indone	I '14:— 4,236	*p*-Amino-phenol [S+Na_2S]	S
	INDIGO GROUP DYE			
888	Indigo MLB/T	I '14:— 10,730 I '20:— 827	*o*-Toluidine (2 mols) [Chloro-acetic, soda-mide, etc.]	V

p-Toluidine

Note.—C. A. numbering begins with NH_2*, while German and English numbering generally starts from* CH_3



$= C_7H_9N = 107$

STATISTICS.—Imported '14:— 24,686 lbs.
Manufactured '17:—223,778 lbs.
Manufactured '18:—205,852 lbs.
Manufactured '19:—575,841 lbs.
Manufactured '20:—894,169 lbs.

FORMATION.—Toluene is nitrated to a mixture of *o*- *and* *p*-nitro-toluenes, which are separated. The *p*-nitro-toluene is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #234–240, 261

Dyes Derived from *p*-Toluidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES			
482	Alizarin Yellow FS		Aniline *and* *o*-Toluidine [*or* Magenta] Salicylic Acid (3 mols)	M
	TRIPHENYL-METHANE DYES			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (2 mols) [Nitro-benzene and iron *or* Arsenic Acid]	B
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	Aniline *o*-Toluidine [Nitro-benzene, etc.; *or* Arsenic Acid]	B

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
514	Red Violet 5R	I '14:— 331 I '20:— 750	Aniline *o*-Toluidine [Nitro-benzene, etc.; *or* Arsenic Acid] [Methylation *or* ethylation] *or* [Magenta methylated *or* ethylated]	B
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	Aniline (5 mols) [Benzoic Acid]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (3–4 mols) *o*-Toluidine [Benzoic Acid] *or* [Magenta phenylated]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	Aniline *o*-Toluidine [Sulfonation] *or* [Magenta sulfonated]	A
525	Red Violet 5RS		Aniline *o*-Toluidine [Ethylation, Sulfonation] *or* [Red Violet 5R sulfonated]	A
526	Acid Violet 4RS		Aniline *o*-Toluidine [Dimethylation, Trisulfonation] *or* [Magenta methylated, sulfonated]	A

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYES (*continued*)			
535	Methyl Alkali Blue	I '14:— 273 M '18:— ? M '19:— ? I '20:— 29	Aniline (5 mols) [Sulfonation]	A
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	*o*-Toluidine Aniline (3–4 mols) [Sulfonation]	A
537	Methyl Blue for Silk Marine Blue	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	*o*-Toluidine Aniline (4 mols) [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	*o*-Toluidine Aniline (4 mols) [Di- *and* tri-sulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	*o*-Toluidine Aniline (3–5 mols) [Di- *and* tri-sulfonation] *or* [Spirit Blue Sulfonated]	A
540	Pacific Blue		Aniline *o*-Toluidine Diamino-diphenyl-methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		β-Naphthylamine (3 mols) Aniline *o*-Toluidine [Disulfonation]	B

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	XANTHONE DYE			
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	Phthalic anhydride Resorcinol (2 mols) *p*-Toluidine (2 mols) *or* Aniline (2 mols) [PCl_5, Sulfonation]	A
	ACRIDINE DYE			
606	Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	Aniline *o*-Toluidine *or* 2d mol Aniline [Magenta by-product]	B
	THIOBENZENYL DYE			
616	Primuline	I '14:— 67,976 M '17:— 72,461 M '18:— 72,778 M '19:—271,338 I '20:— 441 M '20:—183,179	*p*-Toluidine (4 mols) [Sulfur, Sulfonation]	D
	AZINE DYES			
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl-*p*-phenylene-diamine Aniline [Oxidation]	B
686	Amethyst Violet		Diethyl-*p*-phenylene-diamine Diethyl-aniline [Oxidation]	D
702	Para Blue		Aniline (3–4 mols) *o*-Toluidine *p*-Phenylene-diamine *or* [Spirit Blue and *p*-Phenylene-diamine]	B
703	Rubramine		Nitroso-dimethyl-aniline *o*-Toluidine	B

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	AZINE DYE (*continued*)			
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	Nitroso-dimethyl-aniline *o*-Toluidine	B
	ANTHRAQUINONE AND ALLIED DYES			
852	Alizarin Irisol D, R	I '20:— 401	Quinizarin [Sulfonation]	A
853	Anthraquinone Violet	I '14:— 1,202 I '20:— 1,649	1: 5-Dinitro-anthraquinone [Sulfonation]	ACr
854	Alizarin Viridine DG, FF	I '20:— 11,397	Anthraquinone-2-sulfonic Acid [Sulfonation] [*Or through* Alizarin Bordeaux *from* Alizarin]	M
855	Alizarin Pure Blue B		1-Amino-2: 4-dibromo-anthraquinone [Sulfonation]	ACr
856	Alizarin Astrol B	I '14:— 10,907 I '20:— 15,518	1-Bromo-4-methyl-amino-anthraquinone [Sulfonation]	ACr
859	Cyananthrol R	I '14:— 18,792 I '20:— 2,416	1-Amino-4-bromo-2-methyl-anthraquinone [Sulfonation]	A
860	Cyananthrol G		1-Amino-4-bromo-(chloro)-2-methyl-anthraquinone, etc. [Sulfonation]	A
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	1-Nitro-anthraquinone-6-sulfonic Acid Aniline	ACr

Dyes Derived from *p*-Toluidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES (*continued*)			
865	Alizarin Cyanine Green E		Quinizarin *p*-Toluidine (2 mols) [Sulfonation]	ACr

o-Toluidine-m-sulfonic Acid

See, 4-Amino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

***p*-Toluidine-*o*-sulfonic Acid**

See, 5-Amino-*o*-toluene-sulfonic Acid (*C. A. nomen.*)

8-*p*-Toluino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

See, *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

***m*-Toluylene-diamine**

See, *m*-Tolylene-diamine

***o*: *p*-Toluylene-diamine**

See, *m*-Tolylene-diamine

Toluylene-diamine-sulfonic Acid

See, 3: 5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

***m*-Toluylene-diamine-sulfonic Acid**

See, 4: 6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

***p*-(*o*-Tolyl-azo-)-*o*-toluidine** (*C. A. nomen.*)

See, *o*-Amino-azo-toluene

4-*m*-Tolylene-bis(thiourea) (*C. A. nomen.*)

See, *m*-Tolylene-dithiourea

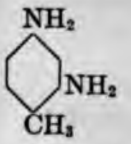
4-*m*-Tolylene-diamine (*C. A. nomen.*)

See, *m*-Tolylene-diamine

***m*-Tolylene-diamine**

4-*m*-Tolylene-diamine (*C. A. nomen.* $NH_2=1$)
m-Toluylene-diamine
o: *p*-Toluylene-diamine

Note.—English and Germans often start numbering from CH_3



$=C_7H_{10}N_2=122$

Statistics.—Imported '14:—135,383 lbs.
Manufactured '17:—302,596 lbs.
Manufactured '18:—612,163 lbs.
Manufactured '19:—439,544 lbs.
Manufactured '20:—689,036 lbs.

Formation.—From *m*-dinitro-toluene by reduction with iron and hydrochloric acid

Literature.—Cain, Intermediate Products (2d Ed.), 86

Dyes Derived from *m*-Tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
34	Chrysoidine R	I '14:—111,006 M '17:— 58,115 M '18:—137,035 M '19:—220,542 I '20:— 1,102 M '20:—186,793	Aniline	B

Dyes Derived from *m*-Tolylene-diamine *(continued)*

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
69	Chrysoidine R		*o*-Toluidine	B
	DISAZO DYES			
284	Vesuvine B Bismarck Brown R	I '14:—171,133 M '17:—262,600 M '18:—295,080 M '19:—631,308 M '20:—484,929	*m*-Tolylene-diamine (3 mols)	B
295	Diphenyl Fast Black	I '14:— 882	Gamma Acid *p*: *p*′-diamino-ditolyl-amine	D
352	Direct Violet R	I '14:— 661 M '19:— ?	Benzidine 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid	D
413	Direct Violet BB	I '14:— 4,396	Dianisidine 1:7-Dihydroxy-naphthalene-4-sulfonic Acid	D
	TRISAZO DYES			
453	Columbia Black R	I '14:— 1,307	Tolidine 2R Acid *m*-Tolylene-diamine (2 mols)	D
455	Columbia Black B	I '14:—165,727	Dianisidine 2R Acid *m*-Tolylene-diamine (2 mols)	D
458	Carbon Black		*p*-Phenylene-diamine-sulfonic Acid [*from* *p*-Nitro-aniline-*o*-sulfonic Acid] 1-Naphthylamine-6(7)-sulfonic Acid *m*-Tolylene-diamine (2 mols)	D

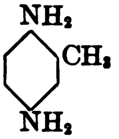
Dyes Derived from *m*-Tolylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYES (*continued*)			
461	Coomassie Union Black		1:4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid *m*-Tolylene-diamine (2 mols)	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline H Acid	D
	ACRIDINE DYES			
602	Acridine Yellow	I '14:— 1,913 M '19:— ?	*m*-Tolylene-diamine (2 mols) [Formaldehyde, Ammonia removal, Oxidation]	B
605	Benzoflavine	I '14:— 600	*m*-Tolylene-diamine (2 mols) Benzaldehyde [Ammonia removal, Oxidation]	B
	AZINE DYE			
670	Neutral Red	M '18:— ?	Nitroso-dimethyl-aniline *or* Dimethyl-*p*-phenylene-diamine [Oxidation]	B
	SULFUR DYE			
710	Immedial Yellow D	I '14:— 13,400	[Sulfur]	S
711	Immedial Orange N	I '14:— 500	[Sulfur]	S

p-Tolylene-diamine (*C. A. nomen.* $NH_2 = 1$)

p-Toluylene-diamine

Note.—English and Germans often start numbering with CH_3



$= C_7H_{10}N_2 = 122$

STATISTICS.—Manufactured '20:— ?

FORMATION.—By reduction of amino-azo-toluene (from o-toluidine) with zinc dust and hydrochloric acid

LITERATURE.—Nietzki, Ber. **10**, 1158
Green, Organic Coloring Matters (1908), 37

Dyes Derived from p-Tolylene-diamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
124	Diazine Green S	I '14:— 1,340	o-Toluidine Aniline *or* o-Toluidine [*or* Safranine] Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	o-Toluidine Aniline *or* o-Toluidine [*or* Safranine] Phenol	B
126	Indoine Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	o-Toluidine Aniline *or* o-Toluidine [*or* Safranine] β-Naphthol	B

Dyes Derived from *p*-Tolylene-diamine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
127	Methyl Indone B	M '17:— ?	*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] ["Amino-naphthols"]	B
128	Janus Gray B		*o*-Toluidine Aniline *or* *o*-Toluidine [*or* Safranine] etc.	B
	AZINE DYE			
679	Safranine	I '14:— 59,920 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	*o*-Toluidine Aniline *or* 2d mol *o*-Toluidine	B

1-Tolylene-2:6-diamine-4-sulfonic Acid

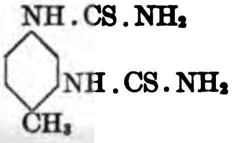
See, 3:5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

m-Tolylene-diamine-sulfonic Acid

See, 4:6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

m-Tolylene-dithiourea

4-*m*-Tolylene-bis[thiourea] (*C. A. nomen.*)



$= C_9H_{12}N_4S_2 = 240$

FORMATION.—By heating *m*-tolylene-diamine thiocyanate several hours on a water bath

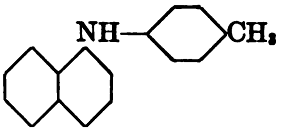
LITERATURE.—Lange, Zwischenprodukte, #801

Dyes Derived from *m*-Tolylene-dithiourea

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	SULFUR DYES			
712	Kryogene Yellow G	I '14:— 1,126 I '20:— 1,543	Benzidine [Sulfur]	S
716	Kryogene Yellow R	I '14:— 4,804	[Sulfur]	S

p-Tolyl-α-naphthylamine

N-*p*-Tolyl-1-*n*aphthylamine (*C. A. nomen.*)



$=C_{17}H_{15}N=233$

FORMATION.—From α-naphthylamine hydrochloride and *p*-toluidine by heating together to about 280°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 186

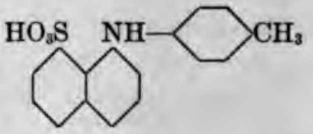
Dye Derived from *p*-Tolyl-α-naphthylamine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DIPHENYL-NAPHTHYL-METHANE DYE			
560	Night Blue	I '14:— 361 M '19:— ? I '20:— 11	Tetraethyl-diamino-benzophenone	B

p-Tolyl-1-naphthylamine-8-sulfonic Acid

8-*p*-Toluino-1-*n*aphthalene-sulfonic Acid (*C. A. nomen.*)

Tolyl-peri Acid



$=C_{17}H_{15}NO_3S=313$

Statistics.—Imports '14:—1,097 lbs.
Manufactured '18:— ?
Manufactured '19:— ?
Manufactured '20:— ?

Formation.—From 1-naphthylamine-8-sulfonic acid and *p*-toluidine by heating together in an autoclave

Literature.—Cain, Intermediate Products (2d Ed.), 195
Lange, Zwischenprodukte, #2859

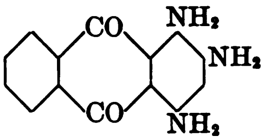
Dyes Derived from *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dye			
189	Sulfon Acid Blue B	I '14:— 35,560 M '17:— ? M '19:— ? M '20:— ?	H Acid	A
	Disazo Dye			
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid α-Naphthylamine	A

Tolyl-peri Acid

See, *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

1:2:4-Triamino-anthraquinone



$=C_{14}H_{11}N_3O_2=253$

FORMATION.—1:4-Diamino-anthraquinone is diacetylated, and then nitrated with nitric acid of sp. gr. 1.5. By reduction of the nitrated product the 1:2:4-triamino-anthraquinone is prepared

LITERATURE.—Lange, Zwischenprodukte, #3333

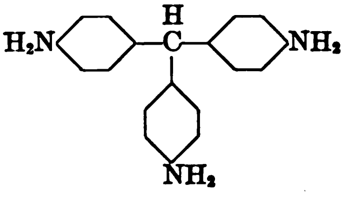
Dye Derived from 1:2:4-Triamino-anthraquinone

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	ANTHRAQUINONE AND ALLIED DYES			
822	Algol Brilliant Orange FR	I '14:— 6,195 I '20:— 482	Benzoyl Chloride	V

Triamino-triphenyl-methane

Tris(*p*-amino-phenyl)-*m*ethane (*C. A. nomen.*)

p-Leucaniline



$=C_{19}H_{19}N_3=289$

FORMATION.—(1) From para-rosaniline by reduction with zinc. (2) From corresponding nitro-compounds by reduction

LITERATURE.—Beilstein, Organische Chemie (3d Ed.), **4**, 1194

Dye Derived from Triamino-triphenyl-methane

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRIPHENYL-METHANE DYE			
511	Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	(Oxidation)	B

α-Trichloro-toluene

See, Benzo-trichloride

3:4:5-Trihydroxy-benzoic Acid

See, Gallic Acid

Trimethyl-*m*-amino-phenyl-ammonium Chloride

See, (*m*-Amino-phenyl)-trimethyl-ammonium Chloride

α-Trinitro-naphthalene

1:3:5-Trinitro-naphthalene (*not considered herein*)

β-Trinitro-naphthalene

1:3:8-Trinitro-naphthalene (*not considered herein*)

γ-Trinitro-naphthalene

1:4:5-Trinitro-naphthalene (*not considered herein*)

δ-Trinitro-naphthalene

1:2:5-Trinitro-naphthalene (*not considered herein*)

1:3:5-Triphenyl-hexahydro-*s*-triazine (*C. A. nomen.*)

See, Anhydro-formaldehyde-aniline

Tris(*p*-amino-phenyl)-methane (*C. A. nomen.*)

See, Triamino-triphenyl-methane

Trisulfonic Acid

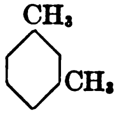
See, Naphthalene-1:3:6-trisulfonic Acid

5:5′-Ureido-bis(2-amino-benzene-sulfonic Acid) (*C. A. nomen.*)

See, Diamino-diphenyl-urea-disulfonic Acid

m-Xylene (*C. A. nomen.*)

m-Xylol



$= C_8H_{10} = 106$

FORMATION.—This occurs in commercial crude xylol as the most abundant constituent, and is separated from its isomers by treating the crude xylol with a limited quantity of sulfuric acid, and by hydrolysis of the sulfonate formed

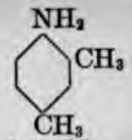
LITERATURE.—Green, Organic Coloring Matters (1908 Ed.), 5

Dye Derived from *m*-Xylene

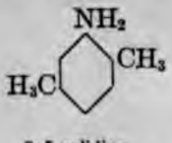
Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
564	TRIPHENYL-METHANE DYE(?) Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	*p*-Dimethylamino-benzaldehyde Dimethyl-aniline	A

Xylidine

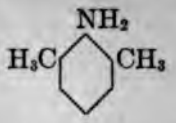
The crude mixture contains the following isomers:—



2:4-xylidine
(*m*-4-xylidine)

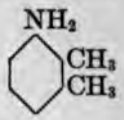


2:5-xylidine
(p-xylidine)

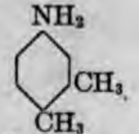


2:6-xylidine
(*m*-2-xylidine)

(C. A. nomen. $NH_2 = 1$)
($CH_3 = 1$)



2:3-xylidine
(*o*-3-xylidine)



3:4-xylidine
(*o*-3-xylidine)

(C. A. nomen. $NH_2 = 1$)
($CH_3 = 1$)

$= C_8H_{11}N = 121$

Statistics.—Imported '14:— 21,836 lbs.
Manufactured '17:—425,873 lbs.
Manufactured '18:—534,834 lbs.
Manufactured '19:—386,635 lbs.
Manufactured '20:—1,054,476 lbs.

Formation.—Xylene is nitrated with mixed acid, preferably cold. The mixed nitro-xylenes are then reduced with iron and hydrochloric acid

Literature.—Cain, Intermediate Products (2d Ed.), 58
Lange, Zwischenprodukte, #742–747

Dyes Derived from Xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	Monoazo Dyes			
76	Sudan II	I '14:— 501 M '17:— 27,595 M '18:— 23,692 M '19:— ? M '20:—170,658	β-Naphthol	ss
77	Azo Coccine 2R		Nevile-Winther's Acid	A
78	Cochineal Scarlet 4R		1-Naphthol-5-sulfonic Acid	A

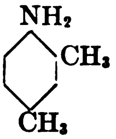
Dyes Derived from Xylidine (*continued*)

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES (*continued*)			
79	Brilliant Orange R Xylidine Orange 2R	I '14:— 4,204 M '17:— ? M '18:— 18,909 M '19:— ? M '20:— ?	Schaeffer's Acid	A
80	Wool Scarlet R	I '14:— 39,888	1-Naphthol-4: 8-disulfonic Acid	A
82	Ponceau R	I '14:— 35,259 M '17:—633,429 M'18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	R Acid	A
	AZINE DYE			
685	Tannin Heliotrope	I '14:— 1,398 I '20:— 249	Nitroso-dimethylaniline	B

2:4-Xylidine (*C. A. nomen.* $NH_2=1$)

m 4-Xylidine ($CH_3=1$)

m-Xylidine



$=C_8H_{11}N = 121$

STATISTICS.—Manufactured '20:—but amount not disclosed

FORMATION.—By separation from commercial xylidine as acetate

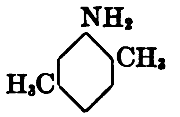
LITERATURE.—Cain, Intermediate Products (2d Ed.), 59

Dyes Derived from 2:4-Xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	MONOAZO DYES			
81	Palatine Scarlet A Brilliant Cochineal	I '14:— 7,510	1-Naphthol-3:6-disulfonic Acid	A
82	Ponceau 2R Scarlet 2R	I '14:— 35,259 M '17:—633,429 M '18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	R Acid [Only small part of total production from *m*-xylidine]	A
	DISAZO DYE			
211	Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	Sulfanilic Acid Resorcinol	A

2:5-Xylidine (*C. A. nomen.* $NH_2=1$)

p-Xylidine ($CH_3=1$)



$= C_8H_{11}N = 121$

FORMATION.—Crude xylidine is treated with sufficient glacial acetic acid to cause the *m*-xylidine acetate to crystallize out. The mother liquor is mixed with hydrochloric acid, and after a few days the *p*-xylidine hydrochloride is separated

LITERATURE.—Cain, Intermediate Products (2d Ed.), 59
Lange, Zwischenprodukte, #742–747

Dye Derived from 2: 5-Xylidine

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	TRISAZO DYE			
438	Melogene Blue BH	M '17:— ? M '18:— ?	Benzidine H Acid (2 mols)	D

m-Xylidine

See, 2: 4-Xylidine (*C. A. nomen.*)

m-4-Xylidine

See, 2: 4-Xylidine (*C. A. nomen.*)

p-Xylidine

See, 2: 5-Xylidine (*C. A. nomen.*)

Xylidine-sulfonic Acid

$C_6H_2 . NH_2 . (CH_3)_2 . SO_3H \quad = C_8H_{11}NO_3S = 201$

FORMATION.—Probably by sulfonation of either crude or purified xylidine with sulfuric acid in a vacuum or in a current of an indifferent gas

LITERATURE.—Thorpe, Dic. Chemistry, **5**, 797, 798
Junghahn, Ber. **35**, 3747–3767 (1902)

Dye Derived from Xylidine-sulfonic Acid

Schultz Number for Dye	*Ordinary Name and Class of Dye*	*Statistics of Import and Manufacture*	*Other Intermediates Used and Notes*	*Dye Application Class*
	DISAZO DYE			
214	Fast Brown O	I '14:— 2,000	Xylidine-sulfonic Acid (2 mols) α-Naphthol	A

4-(2:4-Xylyl-azo)-2:5-xylidine (*C. A. nomen.*)
See, Amino-azo-xylene

Y Acid
See, G Acid

Yellow Acid
1:3-Dihydroxy-naphthalene-5:7-disulfonic Acid (*not considered herein*)

Zeta Acid
Naphthasultone-3-sulfonic Acid (*not considered herein*)

FORMULA INDEX OF INTERMEDIATES

The formulas are indexed here for the 487 intermediates for which data and tables are listed. Only one chemical name is given, but on the pages referred to there are enumerated the various trivial names and synonyms.

The arrangement of the formulas follows that of the 1920 Chemical Abstracts (C. A. **14**, 4557) where "The arrangement of symbols in formulas is alphabetical except that in carbon compounds C always comes first, followed immediately by H." "The arrangement of the formulas is also alphabetical except that the number of atoms of any specific kind influences the order of compounds," *e.g.*, all compounds with C_6 come before those with C_7, thus C_6H_5Cl precedes $C_7H_6ClNO_2$. This is likewise true for *all* the other atoms, and consequently we find $C_7H_6ClNO_2$ before C_7H_9N, and $C_8H_2Br_2ClNO$ before $C_8H_2Cl_4O_4$.

It is believed that a formula index affords the easiest and surest way to find an organic compound, and it is for this reason that this index is given. This is particularly true of intermediates where often many names are used for the same chemical individual.

		PAGE
CCl_2O	Phosgene	486
$C_4H_6O_8$	Dihydroxy-tartaric Acid	229
$C_6H_3ClN_2O_4$	1-Chloro-2: 4-dinitro-benzene	161
$C_6H_3ClN_2O_7S$	4-Chloro-3: 5-dinitro-benzene-sulfonic Acid	162
$C_6H_3Cl_2NO_2$	2: 5-Dichloro-nitro-benzene	210
$C_6H_3N_3O_7$	Picric Acid	495
$C_6H_4ClNO_2$	*o-and p*-Chloro-nitro-benzenes	169
$C_6H_4ClNO_5S$	2-Chloro-5-nitro-benzene-sulfonic Acid	169
	4-Chloro-3-nitro-benzene-sulfonic Acid	170
$C_6H_4N_2O_4$	*m*-Dinitro-benzene	251
$C_6H_4N_2O_5$	2: 4-Dinitro-phenol	258
C_6H_5Cl	Chloro-benzene	161
$C_6H_5ClN_2O_2$	2-Chloro-4-nitro-aniline	167
$C_6H_5ClO_2S$	Benzene-sulfonyl Chloride	125
$C_6H_5Cl_2N$	2: 5-Dichloro-aniline	206
$C_6H_5Cl_2NO$	2-Amino-4: 6-dichloro-phenol	50
$C_6H_5NO_2$	Nitro-benzene	430
	p-Nitroso-phenol	448
$C_6H_5NO_3$	Nitro-phenol, *crude*	434
	o-Nitro-phenol	435
	p-Nitro-phenol	436
	4-Nitroso-resorcinol	449
$C_6H_5N_3O_4$	2: 4-Dinitro-aniline	248
$C_6H_5N_3O_5$	Picramic Acid	494
$C_6H_6ClNO_3S$	2-Amino-6-chloro-benzene-sulfonic Acid	45
$C_6H_6N_2O_2$	*m*-Nitro-aniline	420
	p-Nitro-aniline	421
$C_6H_6N_2O_5S$	2-Amino-5-nitro-benzene-sulfonic Acid	74
	4-Amino-3-nitro-benzene-sulfonic Acid	75
	6-Nitro-metanilic Acid	434
$C_6H_6N_2O_6S$	2-Amino-6-nitro-phenol-4-sulfonic Acid	77
C_6H_6O	Phenol	459
$C_6H_6O_2$	Resorcinol	509
$C_6H_6O_3$	Pyrogallol	499
$C_6H_6O_6S$	Pyrogallol-5-sulfonic Acid	500
C_6H_7N	Aniline	90
C_6H_7NO	*m*-Amino-phenol	77
	p-Amino-phenol	78
$C_6H_7NO_3S$	Metanilic Acid	333
	Sulfanilic Acid	528
$C_6H_7NO_4S$	2-Amino-phenol-4-sulfonic Acid	80
	3-Amino-phenol-4-sulfonic Acid	81
$C_6H_7NO_6S_2$	2-Amino-*p*-benzene-disulfonic Acid	39
	4-Amino-*m*-benzene-disulfonic Acid	39
$C_6H_7NO_7S_2$	4-Amino-phenol-2: 6-disulfonic Acid	79
$C_6H_7N_3O_2$	4-Nitro-*m*-phenylene-diamine	437
$C_6H_8N_2$	*m*-Phenylene-diamine	465
	p-Phenylene-diamine	470
$C_6H_8N_2O_3S$	*p*-Phenylene-diamine-sulfonic Acid	474
	Phenyl-hydrazine-*p*-sulfonic Acid	481
$C_6H_8N_2O_4S$	2: 6-Diamino-1-phenol-4-sulfonic Acid	198
$C_6H_8N_2O_6S_2$	*m*-Phenylene-diamine-disulfonic Acid	473
$C_6H_{10}O_3$	Aceto-acetic Ethyl Ester	21
$C_7H_4ClNO_3$	2-Chloro-5-nitro-benzaldehyde	168
	2-Chloro-6-nitro-benzaldehyde	168
$C_7H_4Cl_2O$	2: 5-Dichloro-benzaldehyde	209

		PAGE
C_7H_5ClO	Benzoyl Chloride	140
	o-Chloro-benzaldehyde	158
$C_7H_5ClO_4S$	2-Chloro-benzaldehyde-6-sulfonic Acid	159
$C_7H_5Cl_3$	Benzo-trichloride	138
$C_7H_5NO_3$	*m*-Nitro-benzaldehyde	427
	o-Nitro-benzaldehyde	428
	p-Nitro-benzaldehyde	429
$C_7H_6ClNO_2$	*p*-Nitro-benzyl Chloride	432
$C_7H_6N_2O_4$	2: 4-Dinitro-toluene	261
$C_7H_6N_2O_5$	Dinitro-*p*-cresol	252
C_7H_6O	Benzaldehyde	120
$C_7H_6O_2$	Benzoic Acid	137
	m-Hydroxy-benzaldehyde	308
$C_7H_6O_2S$	Thio-salicylic Acid	544
$C_7H_6O_3$	Salicylic Acid	518
$C_7H_6O_4$	α-Resorcylic Acid	516
	β-Resorcylic Acid	517
$C_7H_6O_4S$	Benzaldehyde-*o*-sulfonic Acid	122
$C_7H_6O_5$	Gallic Acid	289
$C_7H_6O_7S_2$	Benzaldehyde-disulfonic Acid	121
C_7H_7Cl	Benzyl Chloride	143
$C_7H_7ClO_2S$	*p*-Toluene-sulfonyl Chloride	551
C_7H_7NO	*m*-Amino-benzaldehyde	37
	p-Amino-benzaldehyde	38
$C_7H_7NO_2$	*m*-Amino-benzoic Acid	40
	Anthranilic Acid	110
	o-Nitro-toluene	450
	p-Nitro-toluene	451
$C_7H_7NO_3$	5-Amino-salicylic Acid	84
	o-Nitro-anisole	426
$C_7H_7NO_4$	Gallamide	287
$C_7H_7NO_5S$	5-Nitro-*o*-toluene-sulfonic Acid	452
	p-Sulfo-anthranilic Acid	532
C_7H_8ClNO	5-Chloro-*o*-anisidine	156
$C_7H_8ClNO_3S$	2-Amino-5-chloro-*p*-toluene-sulfonic Acid	46
$C_7H_8N_2O$	*p*-Nitroso-methyl-aniline	446
$C_7H_8N_2O_2$	2-Nitro-*p*-toluidine	454
	3-Nitro-*p*-toluidine	455
	5-Nitro-*o*-toluidine	455
$C_7H_8N_2O_3$	2-Amino-6-nitro-*p*-cresol	75
	4-Nitro-*o*-anisidine	425
	5-Nitro-*o*-anisidine	426
C_7H_8O	Cresol	177
$C_7H_8O_2$	Resorcinol Methyl Ether	515
C_7H_9N	*N*-Methyl-aniline	336
	Toluidines (mixed)	552
	m-Toluidine	553
	o-Toluidine	554
	p-Toluidine	560
C_7H_9NO	2-Amino-*p*-cresol	47
	3-Amino-*p*-cresol	48
	o-Anisidine	107
$C_7H_9NO_3S$	4-Amino-*m*-toluene-sulfonic Acid	86
	5-Amino-*o*-toluene-sulfonic Acid	87
$C_7H_{10}N_2$	*m*-Tolylene-diamine	566
	p-Tolylene-diamine	569
$C_7H_{10}N_2O_3S$	3: 5-Diamino-*p*-toluene-sulfonic Acid	200
	4: 6-Diamino-*m*-toluene-sulfonic Acid	200
$C_8H_2Br_2ClNO$	5: 7-Dibromo-isatin Chloride	206
$C_8H_2Cl_4O_4$	Tetrachloro-phthalic Acid	536
$C_8H_4Cl_2O_4$	3: 6-Dichloro-phthalic Acid	211
$C_8H_4O_3$	Phthalic Anhydride	487
$C_8H_5NO_2$	Isatin	321
	Phthalimide	493
$C_8H_6ClNO_4S$	4-Chloro-2-nitro-phenyl-thioglycolic Acid	170
C_8H_6OS	2-Hydroxy-thionaphthene	313
$C_8H_7ClO_2S$	*m*-Chloro-phenyl-thioglycolic Acid	171
C_8H_7NO	Indoxyl	320
C_8H_7NOS	5-Amino-2-hydroxy-thionaphthene	58
$C_8H_7NO_3$	2-Nitro-*m*-tolualdehyde	449
$C_8H_7NO_4S$	*o*-Nitro-phenyl-thioglycolic Acid	438
$C_8H_8N_2O_3$	*p*-Nitro-acetanilide	417
$C_8H_8O_3$	*o*-Cresotic Acid	177
$C_8H_8O_5$	Gallic Acid Methyl Ester	293
$C_8H_8O_7S_2$	3-Methyl-benzaldehyde-4: 6-disulfonic Acid	337
C_8H_9N	Anhydro-formaldehyde-*o*-toluidine	90
C_8H_9NO	Acetanilide	21
$C_8H_9NO_2$	Phenyl-glycine	475
C_8H_{10}	*m*-Xylene	575
$C_8H_{10}N_2O$	*p*-Amino-acetanilide	26
	p-Nitroso-dimethyl-aniline	439
	p-Nitroso-ethyl-aniline	445
$C_8H_{11}N$	Dimethyl-aniline	237
	N-Ethyl-aniline	271
	N-Methyl-*o*-toluidine	345
	Xylidine	576
	2: 4-Xylidine ($NH_2=1$)	577
	2: 5-Xylidine ($NH_2=1$)	578
$C_8H_{11}NO$	2-Amino-*p*-cresol Methyl Ether	49
	m Dimethylamino-phenol	236
	m-Ethylamino-phenol	271
	p-Phenetidine	458
$C_8H_{11}NO_3S$	Xylidine-sulfonic Acid	579
$C_8H_{12}N_2$	*N*: *N*-Dimethyl-*m*-phenylene-diamine	244
	N: *N*-Dimethyl-*p*-phenylene-diamine	244
	Ethyl-phenyl-hydrazine	277
$C_8H_{12}N_2O_3S_2$	*N*: *N*-Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid	246
$C_9H_6O_3S$	2-Hydroxy-thionaphthene-1-carboxylic Acid	315
C_9H_7BrOS	5-Bromo-2-hydroxyl-3-methyl-thionaphthene	150
$C_9H_7ClO_4S$	5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid	171
C_9H_7N	Isoquinoline	323
	Quinoline	503
$C_9H_9ClO_2S$	4-Chloro-2-Tolyl-thioglycolic Acid	172
C_9H_9NO	7-Methyl-indoxyl	341
$C_9H_9NO_4$	Phenyl-glycine-*o*-carboxylic Acid	478
$C_9H_{10}ClNO$	*p*-Dimethylamino-benzoyl Chloride	232
$C_9H_{11}NO$	*p*-Dimethylamino-benzaldehyde	231
$C_9H_{12}N_2O$	*p*-Nitroso-ethyl-*o*-toluidine	446
$C_9H_{12}N_2O_2$	5-Dimethylamino-2-nitroso-*p*-cresol	236
$C_9H_{12}N_4S_2$	*m*-Tolylene-dithiourea	570
$C_9H_{13}N$	*N*-Ethyl-*N*-methyl-aniline	274
	N-Ethyl-*o*-toluidine	281
	N-Ethyl-*p*-toluidine	282
	Mesidine	332
	Pseudocumidine	497
$C_9H_{14}N_2$	*o*-Amino-benzyl-dimethylamine	42
	p-Amino-benzyl-dimethylamine	42
	*N*¹-Ethyl-4-*m*-tolylene-diamine	283
	*N*¹-Ethyl-*p*-tolylene-diamine	283
$C_9H_{15}ClN_2$	(*m*-Amino-phenyl)-trimethyl-ammonium Chloride	82
$C_{10}H_6N_2O_4$	1: 5-Dinitro-naphthalene	256
	1: 5-*and* 1: 8-Dinitro-naphthalenes	256
	1: 8-Dinitro-naphthalene	257
$C_{10}H_6O_2$	1: 2-Naphthoquinone	381
$C_{10}H_6O_4$	Naphthazarin	352
$C_{10}H_6O_5S$	1: 2-Naphthoquinone-4-sulfonic Acid	382
$C_{10}H_6O_8S_2$	1: 2-Naphthoquinone-4: 6-disulfonic Acid	381

		PAGE
$C_{10}H_7ClO_4S$	1-Chloro-8-naphthol-4-sulfonic Acid	165
	1-Chloro-8-naphthol-5-sulfonic Acid	166
$C_{10}H_7ClO_7S_2$	1-Chloro-8-naphthol-3: 6-disulfonic Acid	164
$C_{10}H_7NO_2$	1-Nitroso-2-naphthol	447
$C_{10}H_7NO_8S_3$	1: 8-Naphthasultam-2: 4-disulfonic Acid	351
$C_{10}H_8$	Naphthalene	347
$C_{10}H_8Cl_2N_2O_4S$	1-(2: 5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone	212
$C_{10}H_8N_2O_4S$	1-Nitroso-2-naphthylamine-6-sulfonic Acid	448
$C_{10}H_8N_2O_6S$	1-Amino-8-nitro-2-naphthol-4-sulfonic Acid	76
	1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid	533
$C_{10}H_8O$	α-Naphthol	359
	β-Naphthol	361
$C_{10}H_8O_2$	1: 5-Dihydroxy-naphthalene	222
	2: 7-Dihydroxy-naphthalene	223
$C_{10}H_8O_4$	7: 8-Dihydroxy-4-methyl-coumarin	222
$C_{10}H_8O_4S$	Croceine Acid	179
	1-Naphthol-5-sulfonic Acid	375
	2-Naphthol-1-sulfonic Acid	376
	2-Naphthol-7-sulfonic Acid	377
	Nevile-Winther's Acid	413
	Schaeffer's Acid	525
$C_{10}H_8O_5S$	1: 7-Dihydroxy-naphthalene-4-sulfonic Acid	224
	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	225
$C_{10}H_8O_6S_2$	Naphthalene-1: 5-disulfonic Acid	348
	Naphthalene-1: 6-disulfonic Acid	348
	Naphthalene-2: 7-disulfonic Acid	348
$C_{10}H_8O_7S_2$	G Acid	286
	1-Naphthol-3: 6-disulfonic Acid	369
	1-Naphthol-3: 8-disulfonic Acid	370
	1-Naphthol-4: 8-disulfonic Acid	372
	2-Naphthol-3: 7-disulfonic Acid	373
	R Acid	504
$C_{10}H_8O_8S_2$	Chromotropic Acid	173
$C_{10}H_8O_9S_3$	Naphthalene-1: 3: 5-trisulfonic Acid	349
	Naphthalene-1: 3: 6-trisulfonic Acid	350
$C_{10}H_8O_{10}S_3$	1-Naphthol-3: 6: 8-trisulfonic Acid	379
	2-Naphthol-3: 6: 8-trisulfonic Acid	380
$C_{10}H_9N$	Lepidine	331
	α-Naphthylamine	384
	β-Naphthylamine	391
	Quinaldine	501
$C_{10}H_9NO$	5-Amino-1-naphthol	62
$C_{10}H_9NO_3S$	Broenner's Acid	152
	Laurent's Acid	329
	Naphthionic Acid	353
	1-Naphthylamine-2-sulfonic Acid	398
	1-Naphthylamine-6-sulfonic Acid	399, 400
	1-Naphthylamine-7-sulfonic Acid	400, 401
	1-Naphthylamine-8-sulfonic Acid	402
	2-Naphthylamine-1-sulfonic Acid	402
	2-Naphthylamine-5-sulfonic Acid	403
	2-Naphthylamine-7-sulfonic Acid	404
	2-Naphthylamine-8-sulfonic Acid	403, 405
$C_{10}H_9NO_4S$	1-Amino-2-naphthol-4-sulfonic Acid	67
	1-Amino-2-naphthol-6-sulfonic Acid	68
	1-Amino-5-naphthol-7-sulfonic Acid	69
	1-Amino-8-naphthol-4-sulfonic Acid	69
	1-Amino-8-naphthol-5-sulfonic Acid	71
	2-Amino-1-naphthol-4-sulfonic Acid	72
	2-Amino-3-naphthol-6-sulfonic Acid	72
	Gamma Acid	294
	J Acid	324
$C_{10}H_9NO_6S_2$	Amino-G Acid	54
	Amino-R Acid	83
	Freund's Acid	285
	1-Naphthylamine-3: 8-disulfonic Acid	393
	1-Naphthylamine-4: 6-disulfonic Acid	394
	1-Naphthylamine-4: 7-disulfonic Acid	394
	1-Naphthylamine-4: 8-disulfonic Acid	395
	1-Naphthylamine-5: 7-disulfonic Acid	395
	2-Naphthylamine-5: 7-disulfonic Acid	396
$C_{10}H_9NO_7S_2$	1-Amino-8-naphthol-2: 4-disulfonic Acid	63
	1-Amino-8-naphthol-3: 5-disulfonic Acid	64
	H Acid	298
	K Acid	325
	2 R Acid	507
$C_{10}H_9NO_9S_3$	1-Naphthylamine-3: 6: 8-trisulfonic Acid	406
	1-Naphthylamine-4: 6: 8-trisulfonic Acid	407
	2-Naphthylamine-3: 6: 8-trisulfonic Acid	407
$C_{10}H_{10}N_2O$	3-Methyl-1-phenyl-5-pyrazolone	343
$C_{10}H_{10}N_2O_3S$	1: 3-Naphthylene-diamine-6-sulfonic Acid	409
	1: 4-Naphthylene-diamine-2-sulfonic Acid	410
	1: 4-Naphthylene-diamine-6-sulfonic Acid	411
	2: 7-Naphthylene-diamine-sulfonic Acid	411
$C_{10}H_{10}N_2O_4S$	3-Methyl-1-(*p*-sulfophenyl)-5-pyrazolone	344
$C_{10}H_{10}N_2O_6S_2$	1: 5-Naphthylene-diamine-3: 7-disulfonic Acid	408
	1: 8-Naphthylene-diamine-3: 6-disulfonic Acid	409
$C_{10}H_{11}ClO_3S$	4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid	163
$C_{10}H_{14}N_2O$	*p*-Nitroso-diethyl-aniline	438
$C_{10}H_{14}N_2O_2$	5-Diethylamino-2-nitroso-phenol	215
$C_{10}H_{15}N$	Diethyl-aniline	217
$C_{10}H_{15}NO$	*m*-Diethylamino-phenol	215
$C_{10}H_{15}NO_3S$	Diethyl-aniline-*m*-sulfonic Acid	218
$C_{10}H_{16}N_2$	*N*: *N*′-Diethyl-*m*-phenylene-diamine	219
	N: *N*′-Diethyl-*p*-phenylene-diamine	220
$C_{10}H_{16}N_2O_3S_2$	Diethyl-*p*-phenylene-diamine-thiosulfonic Acid	220

		PAGE
$C_{11}H_8O_3$	1-Hydroxy-2-naphthoic Acid	310
	3-Hydroxy-2-naphthoic Acid	310
$C_{11}H_8O_7S$	1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid	227
	1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid	228
$C_{11}H_{10}O_3S_2$	5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid	273
$C_{11}H_{10}O_4S$	5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid	268
$C_{11}H_{11}NO_4S$	Methyl-gamma Acid	340
$C_{11}H_{14}ClNO$	*p*-Diethylamino-benzoyl Chloride	213
$C_{11}H_{17}NO$	3-Diethylamino-*p*-cresol	214
$C_{11}H_{18}N_2$	*p*-Amino-benzyl-diethylamine	41
$C_{12}H_6O_2$	Acenaphthenequinone	19
$C_{12}H_7NO_2$	*β*-Naphthisatin	358
$C_{12}H_9N$	Carbazole	154
$C_{12}H_9N_3O$	2-Amino-8-hydroxy-phenazine	57
$C_{12}H_9N_3O_5$	2: 4-Dinitro-4′-hydroxy-diphenylamine	255
$C_{12}H_9N_3O_7S$	2: 4-Dinitro-diphenylamine-3′-sulfonic Acid	254
	2: 4-Dinitro-diphenylamine-4′-sulfonic Acid	254
$C_{12}H_9N_3O_{10}S_2$	2: 5-Dinitro-diphenylamine-3: 4-disulfonic Acid	253
$C_{12}H_{10}Cl_2N_2$	*o*: *o*′-Dichloro-benzidine	210
$C_{12}H_{10}N_2O_5S$	Nitro-diphenylamine-sulfonic Acid	433
$C_{12}H_{10}N_2O_8S_3$	Benzidine-sulfon-disulfonic Acid	136
$C_{12}H_{10}N_4O_4$	4′-Amino-2: 4-dinitro-diphenylamine	51
$C_{12}H_{10}O$	3-Hydroxy-acenaphthene	306
$C_{12}H_{11}N$	Diphenylamine	261
$C_{12}H_{11}NO$	*m*-Hydroxy-diphenylamine	309
$C_{12}H_{11}NO_2$	*α*-Naphthyl-glycine	412
$C_{12}H_{11}NO_3S$	Diphenylamine-sulfonic Acid	262
$C_{12}H_{11}NO_8S_2$	Acetyl-H Acid	22
$C_{12}H_{11}N_3$	Amino-azo-benzene	32
$C_{12}H_{11}N_3O_2$	*o*-Nitro-benzidine	431
$C_{12}H_{11}N_3O_3$	2-Amino-4′-hydroxy-4-nitro-diphenylamine	56
$C_{12}H_{11}N_3O_3S$	Amino-azo-benzene-sulfonic Acid	34
$C_{12}H_{11}N_3O_6S_2$	Amino-azo-benzene-disulfonic Acid	33
$C_{12}H_{12}N_2$	*o*-Amino-diphenylamine	52
	p-Amino-diphenylamine	52
	Benzidine	125
$C_{12}H_{12}N_2O$	4-Amino-4′-hydroxy-diphenylamine	56
$C_{12}H_{12}N_2O_3S$	*p*-Amino-diphenylamine-2-sulfonic Acid	53
	Benzidine-sulfonic Acid	136
$C_{12}H_{12}N_2O_4S$	Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid	22
$C_{12}H_{12}N_2O_6S_2$	Benzidine-disulfonic Acid	135
$C_{12}H_{12}N_2S$	Thioaniline	541
$C_{12}H_{13}N$	Ethyl-*α*-naphthylamine	275
$C_{12}H_{13}NO$	1-Amino-2-naphthol Ethyl Ether	66
$C_{12}H_{13}NO_3S$	Ethyl-2-naphthylamine-7-sulfonic Acid	276
$C_{12}H_{13}NO_4S$	Dimethyl-gamma Acid	243
	Ethyl-gamma Acid	272
$C_{12}H_{13}N_3$	*p*: *p*′-Diamino-diphenylamine	192
$C_{12}H_{13}N_3O$	2: 4-Diamino-4′-hydroxy-diphenylamine	197
$C_{12}H_{13}N_5$	4-Amino-chrysoidine	47
$C_{13}H_{11}NO_4$	Gallanilide	289
$C_{13}H_{12}N_2S$	Thio-carbanilide	542
$C_{13}H_{13}N$	*N*-Methyl-diphenylamine	338
$C_{13}H_{13}NO_3S$	*N*-Methyl-diphenylamine-sulfonic Acid	339
$C_{13}H_{14}N_2$	*p*: *p*′-Diamino-diphenylmethane	192
	N^1-Phenyl-4-*m*-tolylene-diamine	485
$C_{13}H_{14}N_4O_7S_2$	Diamino-diphenyl-urea-disulfonic Acid	193
$C_{14}H_6Br_4N_2O_2$	2: 4: 6: 8-Tetrabromo-1: 5-diamino-anthraquinone	535
$C_{14}H_6Cl_2O_2$	1: 5-Dichloro-anthraquinone	207
	2: 6-Dichloro-anthraquinone	208
	2: 7-Dichloro-anthraquinone	208
$C_{14}H_6N_2O_6$	Dinitro-anthraquinones	250
	1: 5-Dinitro-anthraquinone	251
$C_{14}H_6N_2O_{14}S_2$	1: 5-Dinitro-anthraflavic-3: 7-disulfonic Acid	249
$C_{14}H_6N_2O_{16}S_2$	4: 8-Dinitro-anthrachrysone-2: 6-disulfonic Acid	249
$C_{14}H_7BrO_2$	1-Bromo-anthraquinone	149
$C_{14}H_7Br_2NO_2$	1-Amino-2: 4-dibromo-anthraquinone	50
$C_{14}H_7ClO_2$	1-Chloro-anthraquinone	156
	2-Chloro-anthraquinone	157
$C_{14}H_7NO_6$	Nitro-alizarin (*crude*)	418
	3-Nitro-alizarin	418
	4-Nitro-alizarin	419
$C_{14}H_7NO_7$	3-Nitro-flavopurpurin	433
$C_{14}H_7NO_7S$	1-Nitro-anthraquinone-6-sulfonic Acid	427
$C_{14}H_8BrNO_3$	1-Amino-2-bromo-4-hydroxy-anthraquinone	44
$C_{14}H_8Br_2N_2O_2$	1: 4-Diamino-2: 3-dibromo-anthraquinone	191
$C_{14}H_8ClNO_2$	1-Amino-6-chloro-anthraquinone	45
$C_{14}H_8O_2$	Anthraquinone	111
	Phenanthrene-quinone	458
$C_{14}H_8O_2S$	1-(or 2-)Mercapto-anthraquinone	332
$C_{14}H_8O_4$	Alizarin	24
	Anthrarufin	116
	Quinizarin	502
$C_{14}H_8O_5$	Purpurin	498
$C_{14}H_8O_5S$	Anthraquinone-2-sulfonic Acid	114
$C_{14}H_8O_6$	Anthrachrysone	109
$C_{14}H_8O_8S_2$	Anthraquinone-1: 5-*and* 1: 8-disulfonic Acids	112
	Anthraquinone-2: 6-disulfonic Acid	112
	Anthraquinone-2: 7-disulfonic Acid	113
$C_{14}H_9NO_2$	1-Amino-anthraquinone	29
	2-Amino-anthraqiunone	30
$C_{14}H_9NO_3$	1-Amino-4-hydroxy-anthraquinone	55
$C_{14}H_9NO_4$	3-Amino-alizarin	27
	4-Amino-alizarin	28
$C_{14}H_9NO_5$	1-Amino-4: 5: 8-trihydroxy-anthraquinone	88
$C_{14}H_9NO_5S$	1: 5-*and* 1: 8-Amino-anthraquinone-sulfonic Acids	31
$C_{14}H_{10}$	Anthracene	108
$C_{14}H_{10}N_2O$	2-Isatin Anilide	321
$C_{14}H_{10}N_2O_2$	Diamino-anthraquinones	189
	1: 4-Diamino-anthraquinone	187
	1: 5-Diamino-anthraquinone	188
$C_{14}H_{10}N_2O_4$	4: 8-Diamino-anthrarufin	189
$C_{14}H_{10}N_2O_{10}S_2$	Dinitro-stilbene-disulfonic Acid	260
$C_{14}H_{10}O$	1-Anthrol	117
	9-Anthrol	118
$C_{14}H_{10}O_2$	1-Hydroxy-anthranol	307
$C_{14}H_{10}O_3$	*o*-Benzoyl-benzoic Acid	140
$C_{14}H_{11}N_3O_2$	1: 2: 4-Triamino-anthraquinone	573
$C_{14}H_{12}N_2O_3S_2$	Dehydro-thio-*p*-toluidine-sulfonic Acid	182
$C_{14}H_{12}N_2O_{10}S_2$	Dinitro-dibenzyl-disulfonic Acid	252
$C_{14}H_{12}N_2S$	Dehydro-thio-*p*-toluidine	181
$C_{14}H_{14}N_2O_6S_2$	Diamino-stilbene-disulfonic Acid	199

		PAGE
$C_{14}H_{15}N$	Benzyl-methyl-aniline	146
$C_{14}H_{15}N_3$	*o*-Amino-azo-toluene	35
$C_{14}H_{15}N_3O_3S$	*o*-Amino-azo-toluene-sulfonic Acid	36
$C_{14}H_{15}N_3O_6S_2$	Dimethylamino-azo-benzene-disulfonic Acids	230
$C_{14}H_{16}N_2$	*o*-Tolidine	545
$C_{14}H_{16}N_2O$	4-Dimethylamino-4′-hydroxy-diphenylamine	234
	Ethoxy-benzidine	267
$C_{14}H_{16}N_2O_2$	Dianisidine	201
$C_{14}H_{16}N_2O_2S$	*N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide	60
$C_{14}H_{16}N_2O_6S_2$	*o*-Tolidine-disulfonic Acid	550
$C_{14}H_{16}N_4$	Dimethyl-*p*: *p*′-diamino-azobenzene	242
$C_{14}H_{16}N_4O$	Diamino-azoxy-toluene	190
$C_{14}H_{17}N_3$	*p*: *p*′-Diamino-ditolyl-amine	194
$C_{15}H_7ClO_4$	1-Chloro-anthraquinone-2-carboxylic Acid	158
$C_{15}H_8ClNO_3$	2-Anthraquinonyl-urea Chloride	116
$C_{15}H_{10}BrNO_2$	1-Amino-4-bromo-2-methyl-anthraquinone	44
	1-Bromo-4-methylamino-anthraquinone	151
	2-Bromo-1-methylamino-anthraquinone	151
$C_{15}H_{10}O_2$	2-Methyl-anthraquinone	336
$C_{15}H_{11}NO_2$	1-Amino-2-methyl-anthraquinone	59
	1-Methylamino-anthraquinone	335
$C_{15}H_{11}NO_3$	1-Amino-4-methoxy-anthraquinone	59
$C_{15}H_{17}N$	Benzyl-ethyl-aniline	144
$C_{15}H_{17}NO$	3-Ethoxy-4′-methyl-diphenylamine	270
$C_{15}H_{17}NO_3S$	Ethyl-sulfobenzyl-aniline	278
$C_{15}H_{17}NO_6S_2$	Benzyl-ethyl-aniline-disulfonic Acid	145
$C_{15}H_{17}N_3$	*p*-Amino-benzylidene-ethyl-phenyl-hydrazone	43
$C_{15}H_{18}N_2$	*p*: *p*′-Diamino-ditolyl-methane	195
	*N*³-Ethyl-*N*¹-phenyl-4-*m*-tolylene-diamine	277
$C_{15}H_{18}N_2O_3S$	Ethyl-sulfobenzyl-*p*-phenylene-diamine	280
$C_{15}H_{18}N_2O_6S_3$	Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid	280
$C_{16}H_{10}N_2O_2$	Indirubin	320
$C_{16}H_{11}NO_3$	1-Acetamido-anthraquinone	20
	2-Acetamido-anthraquinone	20
$C_{16}H_{11}NO_6S$	*β*-Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid	311
$C_{16}H_{12}O_5$	Resorcinol-succinein	516
$C_{16}H_{13}N$	Phenyl-*α*-naphthylamine	482
	Phenyl-*β*-naphthylamine	483
$C_{16}H_{13}NO_3S$	Phenyl-1-naphthylamine-8-sulfonic Acid	484
$C_{16}H_{13}NO_4S$	Phenyl-gamma Acid	474
$C_{16}H_{14}N_4O_6$	Diacetyl-*o*: *o*′-dinitro-benzidine	187
$C_{16}H_{15}NO_4$	(Dimethylamino-hydroxy-benzoyl)-benzoic Acid	233
$C_{16}H_{16}N_2S$	Dehydro-thio-*m*-xylidine	184
	iso-Dehydro-thio-*m*-xylidine	185
$C_{16}H_{17}NO_2$	4-Dimethylamino-3′-methoxy-benzophenone	235
$C_{16}H_{18}N_2O$	Dimethylamino-benzoyl-methyl-aniline	232
$C_{16}H_{19}N_3$	Amino-azo-xylene	37
	p-Diethylamino-azo-benzene	213
$C_{17}H_9ClO$	Chloro-benzanthrone	160
$C_{17}H_{10}BrNO_2$	4-Bromo-*N*-methyl-anthrapyridone	152
$C_{17}H_{10}O$	Benzanthrone	123
$C_{17}H_{15}N$	Benzyl-*α*-naphthylamine	147
	Methyl-phenyl-*α*-naphthylamine	342
	Methyl-phenyl-*β*-naphthylamine	342
	p-Tolyl-*α*-naphthylamine	571
$C_{17}H_{15}NO_3S$	*p*-Tolyl-1-naphthylamine-8-sulfonic Acid	572
$C_{17}H_{20}N_2O$	Ketone	327
$C_{17}H_{22}N_2$	Diamino-dixylyl-methane	195
	4: 4′-Dimethyl-diamino-3: 3′-ditolyl-methane	242
	p: *p*′-Tetramethyl-diamino-diphenyl-methane	539
$C_{17}H_{22}N_2O$	Hydrol	304
$C_{17}H_{22}N_2O_3S$	*p*: *p*′-Tetramethyl-diamino-diphenyl-methane-sulfonic Acid	540
$C_{17}H_{22}N_2O_4S$	*p*: *p*′-Tetramethyl-diamino-benzohydrol-sulfonic Acid	538
$C_{18}H_{12}O$	Methyl-benzanthrone	338
$C_{18}H_{12}O_3$	Naphthoyl-benzoic Acid	383
$C_{18}H_{14}N_2O_4$	1: 6-(*or* 1: 7-)Diacetamido-anthraquinone	186
$C_{18}H_{16}N_2$	*N*: *N*′-Diphenyl-*m*-phenylene-diamine	264
$C_{18}H_{16}N_2O$	4-Phenylamino-4′-hydroxy-diphenylamine	463
$C_{19}H_{18}N_2O$	4-Phenylamino-4′-hydroxy-(phenyl-3′-tolylamine)	464
$C_{19}H_{19}N_3$	Triamino-triphenyl-methane	573
$C_{20}H_{11}NO$	Benzanthrone-quinoline	124
$C_{20}H_{15}N_3$	*α*-Amino-azo-naphthalene	35
$C_{20}H_{19}NO_3S$	Dibenzyl-aniline-sulfonic Acid	205
$C_{20}H_{20}N_2$	*N*³-Benzyl-*N*¹-phenyl-4-*m*-tolylene-diamine	148
	N: *N*′-(*o*: *o*′-Ditolyl)-*m*-phenylene-diamine	266
	N: *N*′(*p*: *p*′-Ditolyl)-*m*-phenylene-diamine	266
$C_{21}H_{12}ClNO_3$	1-Benzoylamino-4-chloro-anthraquinone	139
$C_{21}H_{14}N_2O_3$	1-Amino-4-benzoylamino-anthraquinone	40
$C_{21}H_{20}N_2O$	*N*-Benzoyl-*o*-tolidine	142
$C_{21}H_{21}N_3$	Anhydro-formaldehyde-aniline	89
$C_{21}H_{28}N_2O$	*p*: *p*′-Tetraethyl-diamino-benzophenone	537
$C_{21}H_{30}N_2$	*p*: *p*′-Tetraethyl-diamino-diphenyl-methane	538
$C_{21}H_{30}N_2O$	*p*: *p*′-Tetraethyl-diamino-benzohydrol	536
$C_{22}H_{18}N_2O_4S$	4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid	312
$C_{23}H_{18}$	Diphenyl-naphthyl-methane	263
$C_{23}H_{26}N_2$	Diamino-dixylyl-phenyl-methane	196
$C_{23}H_{27}N_3$	*m*-Amino-tetramethyl-*p*′: *p*″-diamino-triphenyl-methane	86
$C_{24}H_{22}N_2$	*N*: *N*′-(*p*: *p*′-Ditolyl)-2: 7-naphthylene-diamine	265
$C_{26}H_{20}N_2$	*N*: *N*′-Di-2-naphthyl-*m*-phenylene-diamine	247
$C_{28}H_{14}N_2O_4$	Indanthrone	316
$C_{28}H_{14}N_2O_7S$	Indanthrone-sulfonic Acid	317
$C_{28}H_{17}N_4NaO_3S_4$	Primuline-sulfonic Acid (Sodium Salt)	495
$C_{28}H_{18}N_4O_3S_4$	Primuline-sulfonic Acid	495
$C_{29}H_{24}N_4O_{12}S_2$	Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)	534
$C_{30}H_{18}O_4$	2: 2′-Dimethyl-1: 1′-bianthraquinone	241

PART II

GLOSSARY OF DYE NAMES
AND
PAGE INDEX OF SCHULTZ NUMBERS

GLOSSARY OF DYE NAMES

The number of dye names in use is very large. Norton, in *Artificial Dyestuffs Used in U. S.*, lists almost six thousand in his index where often a number of individual marks are grouped together under the abbreviation V.M. (Various Marks).

The list of dyes in stock in the German dye factories on August 15, 1919, the so-called Reparation Dyes, embrace over seven thousand marks.

Throughout Germany, Switzerland, United States, France and England, there are probably twelve thousand different dye marks in use, many of these being for the same chemical compound of the same or of different degrees of purity.

This glossary is based largely upon the list given in the index of Dr. Thomas H. Norton's *Artificial Dyestuffs Used in the U. S.*, which is used by permission. A number of corrections have been made to this list, and a great number of additions. These additions comprise all the names first given in Schultz's *Farbstofftabellen*, and many more from various sources. However, a number of the separate marks for a given name are often here listed on the same line to save space.

The new American and English names that have arisen during the past few years have not been included, due to difficulty of adequately treating them.

This glossary copies Norton in assigning Schultz numbers followed by letters to dyes closely related to a given Schultz Dye. Norton's practice regarding dyes of unknown composition is also used, the numbers here employed being the same as given in Norton. Hence ready reference can be made to Norton's book for statistical information concerning these dyes of unknown composition, which could not be classified in these tables. Some of Norton's dyes of unknown composition have been identified and the proper Schultz number assigned.

Under Serial Number Column those numbers without any letter prefixed refer to Schultz Numbers; those with a prefix of A, S, or U refer to Azo, Sulfur or unclassified dyes of unknown composition. V.M. is used for Various Marks as applied to dye names, and Var. means various manufacturers and is employed rather than list a considerable number of manufacturers for a given dye.

The following abbreviations are used for manufacturers.

A.......Actien-Gesellschaft für Anilin-Fabrikation, Berlin
AW.....A. Wiescher & Co., Successors, Haeren, Belgium
B.......Badische Anilin- und Soda-Fabrik, Ludwigshafen
BrAlizCo. British Alizarin Co.
BD......British Dyes, Ltd., Huddersfield
BK......Leipziger Anilinfabrik Beyer & Kegel, Fürstenberg
By......Farbenfabriken vorm. F. Bayer & Co., Leverkusen
ByCo....Bayer & Co., Rensselaer, N. Y.
C.......Leopold Cassella & Co., Frankfort on the Main
ClCo ....Clayton Aniline Co., Clayton near Manchester
CDCo...Central Dyestuff Co., Newark, N. J.
CG......Chemikalienwerk Griesheim, Griesheim on the Main
CJ.....Carl Jäger Anilinfarbenfabrik, Düsseldorf
CR......Clauss & Co. (formerly Claus & Rée), Clayton near Manchester
CV......Colne Vale Chemical Co., Milnsbridge near Huddersfield
DH.....Farbwerke vorm. L. Durand, Huguenin & Co., Germany and France
FA......Farbwerk Ammersfoort, Ammersfoort, Netherlands
G.......Geigy, Basel
GrE.....Chemische Fabrik Griesheim-Elektron, Offenbach on the Main
H.......Read Holliday & Sons, Huddersfield
H&M....Heller & Merz Co., Newark, N. J.
I........Gesellschaft für chemische Industrie, Basel
K.......Kalle & Co., Biebrich on the Rhine
Ki......Kinzlberger & Co., in Prague
L.......Farbwerk Mülheim vorm. A. Leonhardt & Co., Mülheim
Lev.....Levenstein, Ltd., Crumpsall Vale
M.......Farbwerke vorm. Meister Lucius & Brüning, Höchst
NF......Niederländesche Farben- und Chemikalienfabrik Delft, Delft.
P.......Société Anonyme des Matières colorantes et produits chimiques St. Denis (formerly A. Poirrer), St. Denis
Q.......Imports of Unknown Source
S........Chemische Fabrik vorm. Sandoz & Co. Basel
Sch......Schoellkopf Aniline & Chemical Works, Buffalo, now National Aniline & Chemical Co.
tM......Chemische Fabriken vorm. Weiler-ter-Meer, Uerdinger
WB.....W. Beckers Aniline and Chemical Works, Brooklyn
WD.....Wülfing Dahl & Co., Barmen

Note. Within the past few years many of these companies have consolidated or changed names.

Name	Manufacturer	Serial No.
Acetyl Red GX	B	U90
Acetylene Blue 3 B	G	U648
Acetylene Blue 6 B	G	U649
Acid Alizarin Black	M	159
Acid Alizarin Black R	M	159
Acid Alizarin Black SE	M	288
Acid Alizarin Black SN	M	289
Acid Alizarin Black SR	CV	288a
Acid Alizarin Brown B	B	154
Acid Alizarin Blue	...	790
Acid Alizarin Blue BB, GR	M	790
Acid Alizarin Garnet	...	155
Acid Alizarin Garnet R	M	155
Acid Alizarin Green B, G	M	796
Acid Alizarin Green 3 G	I	796a
Acid Alizarin Red B	M	202
Acid Alizarin Violet N	M	294
Acid Alizarin Yellow GGW	M	156
Acid Anthracene Brown	By	88
Acid Anthracene Brown M, P	By	88a
Acid Anthracene Brown PG	By	88a
Acid Anthracene Brown R	By	88
Acid Anthracene Brown RH, W	By	88a
Acid Anthracene Brown WSG	By	88a
Acid Anthracene Red 3 B	By	400
Acid Anthracene Red 5 BL, G	By	400a
Acid Black	AW	217e
Acid Black AO	I	217e
Acid Black AS	Q	269c
Acid Black 10 B	WB	217
Acid Black 6 BA	CG	217e
Acid Black 4 BD	I	217e
Acid Black BR	G	269c
Acid Black BR	tM	269
Acid Black D	I	217e
Acid Black E	By	A144
Acid Black EW	Q	269c
Acid Black G, HA, HAS	I	217e
Acid Black H	S	217e
Acid Black KB	Q	269c
Acid Black M	By	A145
Acid Black M	BK	217e
Acid Black M	H	269c
Acid Black SO	S	217e
Acid Black 32	H	269c
Acid Black 2034	K	217e
Acid Black 2195	BK	217e
Acid Blue	AW	543c
Acid Blue	H&M	539
Acid Blue	K	U301
Acid Blue greenish	K	U301
Acid Blue B	S	565
Acid Blue 7 B	S	565b
Acid Blue BA, C, DRS	Q	543c
Acid Blue E	AW	543c
Acid Blue EX	S	565b
Acid Blue OG	K	U301
Acid Blue AG	K	U301
Acid Blue PN	Q	543c
Acid Blue R	AW	543c
Acid Blue R	S	565b
Acid Blue 5 R	Q	543c
Acid Blue RBF	...	562
Acid Blue V	AW	543
Acid Blue Y	AW	543c
Acid Blue 466	M	U400
Acid Blue 22244	S	565b
Acid Blue 23579	S	565b
Acid Blue Black	AW	A531
Acid Brilliant Red 2 B	By	A146
Acid Brown	C	U273
Acid Brown G	tM,BK	212
Acid Brown R	K	212a
Acid Brown RN	G	212a
Acid Brown SR	K	212a
Acid Brown V	I	212a
Acid Brown Y	P	212
Acid Chrome Black G	I	A147a
Acid Chrome Black LG	By	A147
Acid Chrome Black RH	By	A148
Acid Chrome Black RH	G	A610
Acid Chrome Black RHN	BK	A148a
Acid Chrome Black WS	By	A149
Acid Chrome Black 1551	CV	A723
Acid Chrome Blue	K	U302
Acid Chrome Blue (reddish)	AW	A532
Acid Chrome Red B	By	U209
Acid Chrome Blue B	CV	A724
Acid Chrome Blue 3 G	By	U206
Acid Chrome Red N	CV	A725
Acid Chrome Blue 2 R	By	U207
Acid Chrome Blue 5 R	By	U208
Acid Chrome Violet R	By	U210
Acid Corinth	tM	U522
Acid Corinth 240 S	G	U602
Acid Cresol Black 4196	GrE	U501
Acid Crimson	S	166a
Acid Crimson D	Q	166a
Acid Cyanine BF	A	705b
Acid Dark Green	I	505b
Acid Eosine	...	590
Acid Eosine CA, G	B	590a
Acid Eosine 3 G	CJ	590a
Acid Eosine L new, LB	B	590a
Acid Eosine L 27314, SP	B	590a
Acid Eosine 1632	K	590a
Acid Eosine 13389	CJ	590a
Acid Fast Blue SB	WB	189
Acid Fast Blue SR	WB	188
Acid Fast Green 8 B	AW	A533
Acid Fast Violet	AW	U551
Acid Fuchsine	...	524
Acid Green	I	504
Acid Green	tM	502a
Acid Green	WD	505
Acid Green (V. M.)	C	505a
Acid Green 2 A, B, 2 BA	tM	502a
Acid Green 2 B	P	502
Acid Green 6B, BW	...	504
Acid Green 2 BG	tM	502
Acid Green G	K	505
Acid Green GG	By	505
Acid Indigotine	...	877
Acid Kraft Brown	B	U91
Acid Magenta	By,C	524
Acid Magenta	H,Sch	524
Acid Magenta 6 B	CV	524
Acid Magenta B, F	G	524
Acid Magenta FCNS	GrE	524
Acid Magenta G	G	524
Acid Magenta O	M	524
Acid Magenta S	A,B	524
Acid Magenta S	GrE	524
Acid Magenta 2	CV	524
Acid Magenta Crystals I	CV	524
Acid Milling Black B	...	265
Acid Milling Red G	...	293
Acid Milling Scarlet	ClCo	484
Acid Navy Blue SL	AW	A534
Acid Olive 2764	K	U393
Acidol Azo Violet R	tM	A512
Acidol Azo Violet S	tM	A513
Acidol Fast Violet A 2 R	tM	A514
Acidol Violet BR	tM	U523

Name	Manufacturer	Serial No.
Acid Phosphine R	CR	606d
Acid Pure Blue R	G	U603
Acid Pure Blue RC	G	U604
Acid Purple	Q	U774
Acid Red 2 B, 4 B	K	U304
Acid Red 6 BF	BK	U478
Acid Red CB	Q	U775
Acid Red FL	S	U694
Acid Red G	K	U304
Acid Red G	Q	U776
Acid Red 3 G	K	U304
Acid Red R	K	U304
Acid Red 4 R	K	U304
Acid Red S	AW	A536
Acid Red 3 S	K	U304
Acid Red C19	K	U304
Acid Red 1622	K	U304
Acid Red 1642	K	U304
Acid Red 1645	K	U304
Acid Rhodamine B	B	U92
Acid Rhodamine 3 B	B	U93
Acid Rhodamine BG	B	U94
Acid Rhodamine G	B	U95
Acid Rhodamine R	B	U95
Acid Rosamine A	M	583
Acid Rubine	CJ	524
Acid Scarlet G	Q	U777
Acid Scarlet 2 R	Q	U778
Acid Scarlet SG	A	U779
Acid Silk Black R	By	A150
Acid Silver Black R	By	A150
Acid Silver Gray	Q	U780
Acid Sky Blue	AW	A535
Azo Violet	By,etc.	407
Acid Violet (V. M.)	C	530a
Acid Violet B	BK	530a
Acid Violet BB	B, K	530a
Acid Violet 2 B	H	534a
Acid Violet 4 B	By, K	530
Acid Violet 4 B	Var.	530
Acid Violet 5 B	AW, By	530
Acid Violet 5 B	G, K	530a
Acid Violet 6 B	A, By	529
Acid Violet 6 B	G, tM	530
Acid Violet 6 B	H	548
Acid Violet 7 B	AW	527
Acid Violet 7 B	B,H,I	534
Acid Violet 7 B	K	530a
Acid Violet 8 B	By	527a
Acid Violet 4 BC	B	530
Acid Violet 5 BF	M	530a
Acid Violet 4 BL	B	530a
Acid Violet 4 BLO	B	530a
Acid Violet 4 BLOO	K	530a
Acid Violet 4 BLOOF	B	530
Acid Violet 4 BN	B, I	527
Acid Violet 6 BN	B, M	548
Acid Violet 6 BN	I, WD	548
Acid Violet 6 BN	tM	530
Acid Violet 7 BN	By	527
Acid Violet 7 BN	M	533
Acid Violet 6 BNB	By	527
Acid Violet 6 BNG	G	530
Acid Violet 3 BNO	B	530a
Acid Violet 6 BNO	B	530a
Acid Violet 6 BNOO	K	530a
Acid Violet 4 BNS	S	527
Acid Violet 5 BNS	S	561
Acid Violet 4 BS	Q	530
Acid Violet 6 BS	WD	548
Acid Violet BSC	K	530a
Acid Violet 4 BV	AW	530a
Acid Violet BW	By	527a
Acid Violet C2B, C10B	B	530a
Acid Violet C10B	AW	530a
Acid Violet D	S	561a
Acid Violet HB	H	534a
Acid Violet HW	By	527a
Acid Violet KB	K	530a
Acid Violet NFDS	H	534a
Acid Violet NG	K	530a
Acid Violet PW	B	530a
Acid Violet R	By	527a
Acid Violet R	G	530a
Acid Violet R	Q	530a
Acid Violet 4 R	B	530a
Acid Violet 4 R	By	527a
Acid Violet 4 R	I	534a
Acid Violet 4 RN	K	530a
Acid Violet 4 RS	M	526
Acid Violet RX	H	534a
Acid Violet S	S	561a
Acid Violet SB	Q	530a
Acid Violet 1704	K	530a
Acid Violet 2405	tM	530a
Acid Violet 4746	BK	530a
Acid Violet 10471	I	534a
Acid Violet 10475	I	534a
Acid Violet 18502	I	534a
Acid Violet 26449	S	561a
Acid Violet Blue	Q	U781
Acid Violet Red	Q	U782
Acid Wool Black	Q	217h
Acid Yellow	A,AW	137
Acid Yellow AC	K	137
Acid Yellow D	A	139
Acid Yellow FY	H	137
Acid Yellow G	A, BK	137
Acid Yellow G	Q, S	137
Acid Yellow GG	GrE	136
Acid Yellow GF	H	137
Acid Yellow LR	K	137
Acid Yellow MGS	GrE	136
Acridine Golden Yellow	G	602a
Acridine Golden Yellow 54666A	L	602a
Acridine Golden Yellow, G, GG, W	L	602
Acridine Orange	DH	603
Acridine Orange NOO, NO	L	603
Acridine Orange R	L	604
Acridine Red B	L	569
Acridine Yellow	L	602
Afghan Yellow GX	BD	9
Agalma Black 4 BX	B	217a
Agalma Black 10 BX, 10 B	B	217
Agalma Black 201211	B	217a
Agalma Black Green T	B	217b
Agalma Green B	B	542
Algol Blue G	By	844a
Algol Blue 3 G	By	844
Algol Blue K	By	839
Algol Blue 3 R, 3 RP	By	821
Algol Bordeaux 3 B	By	829
Algol Brilliant Orange FR	By	822
Algol Brilliant Red 2 B	By	819
Algol Brilliant Violet 2 B	By	821
Algol Brilliant Violet R	By	820
Algol Brown B	By	869
Algol Brown R	By	869a
Algol Corinth R	By	870
Algol Dark Green B	By	847a
Algol Gray	By	834
Algol Gray B, BB	By	834
Algol Green B	By	847
Algol Olive R	By	833

Name	Manufacturer	Serial No.
Algol Orange R	By	824
Algol Pink R	By	818
Algol Red B	By	825
Algol Red BB, FF	By	819
Algol Red 2 G, 3 G	By	816a
Algol Red 5 G	By	816
Algol Red, FF, R	By	819
Algol Scarlet G	By	815
Algol Violet B	By	823
Algol Yellow 3 G	By	811
Algol Yellow 6 GL	By	811a
Algol Yellow R	By	817
Algol Yellow WF, WG	By	814
Alizadine Black	H	U744
Alizadine Black M	H	U744
Alizadine Deep Brown 3 R	H	U745
Alizadine Orange M	...	779
Alizadine Yellow Y	H	U746
Alizarin Orange	H	U748
Alizarin paste	Br.Aliz. Co.	778
Alizarin powder	Br.Aliz. Co.	778
Alizarin	Q, etc.	780
Alizarin 11 AB	By	778
Alizarin D 1140	M	778
Alizarin D 1149	M	778
Alizarin D 1399	M	778
Alizarin DCR	M	806a
Alizarin GD	B	784
Alizarin GGX	By	785a
Alizarin GI	B	785
Alizarin I	M	778
Alizarin IB	By, M	778
Alizarin IP	By	778
Alizarin IT	M	778
Alizarin IWS	M	780
Alizarin RG	B	785
Alizarin RVT	By	784a
Alizarin S	By	784b
Alizarin SDG	M	785
Alizarin SX	B	784
Alizarin SXGD	B	784
Alizarin V 1, V 2 A	B	778
Alizarin W	By	780
Alizarin 11 X	By	778
Alizarin XGP	By	785a
Alizarin XP	By	785a
Alizarin 744, 1140	M	778
Alizarin Astrol B, G	By	856
Alizarin Azurine D 3 R	M	U401
Alizarin Black (V.M.)	B	774
Alizarin Black (V.M.)	C	774b
Alizarin Black AB	AW, CV	774b
Alizarin Black AC	M	806a
Alizarin Black B, 3 B	By	774b
Alizarin Black 8 B	AW	774b
Alizarin Black DES, EN	M	806a
Alizarin Black ENT	M	806a
Alizarin Black IA	By	774b
Alizarin Black P	M	806
Alizarin Black R	M	806a
Alizarin Black S	B	774
Alizarin Black S, SE	M	807
Alizarin Black SET, SN	M	807
Alizarin Black SNT	M	807
Alizarin Black SR, WR	B	774
Alizarin Blue (V.M.)	C	803a
Alizarin Blue A, AS	By	803a
Alizarin Blue A	M	803
Alizarin Blue B	M	803a
Alizarin Blue BB, DB	M	803a
Alizarin Blue BR, BR 3 G	By	803a
Alizarin Blue C 2 G	...	799
Alizarin Blue CWRB, CWRR	...	788
Alizarin Blue DH6 GM, DN	M	803a
Alizarin Blue D 2 R, D 4 R	M	803a
Alizarin Blue GR, GW	M	803a
Alizarin Blue GWDS, HJ	By	803a
Alizarin Blue IIX	By	803a
Alizarin Blue JR	By	852
Alizarin Blue NFA, NHN	By	803a
Alizarin Blue NS	By	788
Alizarin Blue NSG	By	803a
Alizarin Blue S	Var.	804
Alizarin Blue SAE	By	858
Alizarin Blue SAP	By	858
Alizarin Blue SAWSA	By	804
Alizarin Blue SB	M	804a
Alizarin Blue SRM	M	804
Alizarin Blue WG	...	803
Alizarin Blue WX	B	803
Alizarin Blue 942	M	804a
Alizarin Blue (violet shade)	S	803a
Alizarin Blue (violet shade) P	S	803a
Alizarin Blue Black	...	862
Alizarin Blue Black B	C	774a
Alizarin Blue Black B	CV, M	862
Alizarin Blue Black B	Q	862
Alizarin Blue Black B, 3 B	By	862
Alizarin Blue Black B, 3 B	M	862
Alizarin Blue Black GT	B	774a
Alizarin Bordeaux	...	787
Alizarin Bordeaux B, BD	By	787
Alizarin Brown	M	782
Alizarin Brown B, D3GO, G	M	782
Alizarin Brown DR, N, RR	M	782
Alizarin Brown O	Q	782
Alizarin Claret R	M	797
Alizarin Claret Red DB	M	U405
Alizarin Claret Red DG	M	U406
Alizarin Chrome Blue T	S	803b
Alizarin Chrome Brown DG	M	U402
Alizarin Chrome Brown DR	M	U403
Alizarin Crimson DB	M	U407
Alizarin Crimson DG	M	U408
Alizarin Chrome Green A	...	260
Alizarin Cyanine G, 2 G, 3 G	By	799
Alizarin Cyanine R	By	788
Alizarin Cyanine WRR	By	788
Alizarin Cyanine Green E (& V.M.)	By	865
Alizarin Cyanole B	...	851
Alizarin Dark Blue DR, S	M	804b
Alizarin Dark Green W	B	775
Alizarin Direct Blue B	M	851
Alizarin Direct Blue EB	M	851a
Alizarin Direct Blue ESB	M	851a
Alizarin Direct Blue ESR	M	851a
Alizarin Direct Cyanine FA	M	U409
Alizarin Direct Green CG, G	M	865
Alizarin Direct Violet R	M	852
Alizarin Direct Yellow DR	M	U410
Alizarin Direct Yellow DS	M	U411
Alizarin Fast Blue DGL	M	U412
Alizarin Fast Brown DB	M	U413
Alizarin Fast Brown D 3 R	M	U414
Alizarin Fast Brown 3 R	M	U415
Alizarin Fast Gray DBL	M	U416
Alizarin Fast Orange DO	M	U417
Alizarin Fast Red D 244	M	U418
Alizarin Fast Scarlet D 6 BS	M	U419
Alizarin Fast Scarlet D 8 BS	M	U420
Alizarin Garnet	AW	797
Alizarin Garnet R	M	797

GLOSSARY OF DYE NAMES

Name	Manu-facturer	Serial No.
Alizarin Gray	C	774d
Alizarin Gray G	M	U421
Alizarin Green B	WD	657
Alizarin Green BB	M	805
Alizarin Green CE, CK	By	808a
Alizarin Green C, CG	By	865
Alizarin Green DGN, DMA	M	805
Alizarin Green G	WD	656
Alizarin Green 3 G, S	M	805
Alizarin Green S	B	808
Alizarin Green SP 4	By	808a
Alizarin Green SW	M	805
Alizarin Green V, VD	By	808a
Alizarin V 3 W	B	778
Alizarin Green WB	M	805
Alizarin Green X	B	808
Alizarin Indigo B	By	894
Alizarin Indigo G	By	893
Alizarin Indigo 3 R	By	895
Alizarin Indigo Blue S	B	809
Alizarin Indigo Green B	By	894a
Alizarin Indigo Violet B	By	894b
Alizarin Irisol D, R	...	852
Alizarin Lake	Q	U783
Alizarin Light Red D 8 BW	M	U422
Alizarin Milling Black 8 B	AW	774c
Alizarin Maroon W	B	798
Alizarin Orange	M, etc.	779
Alizarin Orange A	B	779
Alizarin Orange DG, DN, GR	M	779
Alizarin Orange R	By	779
Alizarin Pure Blue B	By	855
Alizarin Pure Blue DPH	M	U423
Alizarin Pure Yellow DHS	M	U424
Alizarin Red (V.M.)	By	780
Alizarin Red (yellow)	M	780a
Alizarin Red D4B, D10B, DG	M	780a
Alizarin Red G	M	786
Alizarin Red IWS	M	780
Alizarin Red SWB, SWBB	B	780
Alizarin Red SWR, WB	B	780
Alizarin Red SX	B	784
Alizarin Red 3 WS	M	786
Alizarin Red YCA	Br. Aliz.	785
Alizarin Rose GWG	Q	U784
Alizarin Rubinol 5 G, R	By	856a
Alizarin Saphirol B, SE	By	858
Alizarin Sky Blue B	By	855
Alizarin Uranol 12 B	By	U211
Alizarin Uranol R	By	U212
Alizarin Violet (V.M.)	C	599
Alizarin Violet BL	Q	599
Alizarin Violet DH	M	599
Alizarin Viridine DG, FF	By	854
Alizarin Violet N	M	599
Alizarin Yellow A	B	770
Alizarin Yellow C	B	769
Alizarin Yellow CY	By	48
Alizarin Yellow DGC, D 3 G	M	48
Alizarin Yellow DOG, DOO, DR	M	48
Alizarin Yellow FF	WB	48
Alizarin Yellow FS	DH	482
Alizarin Yellow G	S	48
Alizarin Yellow GG	By, I, M	48
Alizarin Yellow 5 G	I, M	48
Alizarin Yellow GGW	M	48
Alizarin Yellow O	M	58a
Alizarin Yellow R	Var.	58
Alizarin Yellow 3 RN	M	58
Alizarin Yellow RW	M	58
Alkali Azurine G		410
Alkali Black	WD	U538
Alkali Blue	ByCo H&M	536
Alkali Blue	Var.	536
Alkali Blues, green shades	Sch	536
Alkali Blues, red shades	Sch	536
Alkali Blue (V.M.)	C	536
Alkali Blue (for printing ink)	G, tM	536
Alkali Blue III	A	536
Alkali Blue IV A	M	536
Alkali Blue 2 AS	M	536
Alkali Blue AWG, AWR	M	536
Alkali Blue AWRG	M	536
Alkali Blue 2 B	A, B	536
Alkali Blue 2 B	M, tM	536
Alkali Blue 3 B	S, tM	536
Alkali Blue 4 B	I, M	536
Alkali Blue 5 BA	B	536
Alkali Blue BK 2	K	536
Alkali Blue 5 BL	B	536
Alkali Blue 7 BOO	GrE	536
Alkali Blue D	A	535
Alkali Blue H 5 BKOOO	GrE	536
Alkali Blue HEOOO	GrE	536
Alkali Blue HHRROOO	GrE	536
Alkali Blue I	A	536
Alkali Blue MN	M	536
Alkali Blue N	B	536
Alkali Blue R	I	536
Alkali Blue 3 R, 5 R, 6 R	tM	536
Alkali Blue RM, RRM	M	536
Alkali Blue 2	M	536
Alkali Blue 1756	K	536
Alkali Blue 1757	K	536
Alkali Blue 11408	B	536
Alkali Brilliant Blue G	WD	536a
Alkali Brown	WD	190
Alkali Dark Brown GV	WD	331
Alkali Fast Green 3 G	By	U213
Alkali Fast Yellow	WD	199a
Alkali Green D	...	475
Alkali Orange GT	...	392
Alkali Rubine	WD	U539
Alkali Violet	K	532
Alkali Violet AS	M	532
Alkali Violet 6 B	B	532
Alkali Violet 6 BO	B	532
Alkali Violet LR	By	U214
Alkali Violet 421	K	532
Alkali Yellow	AW	199
Alkali Yellow R	WD	350
Alpha Black 6 BN	CV	U716
Alpha Black JC	CV	U717
Alpha Chrome Blue A	CV	U718
Alpha Chrome Brown 6 GA	CV	U719
Alpha Chrome Brown N	CV	U720
Alpha Chrome Green 6 B	CV	U721
Alpha Chrome Orange RK	CV	U722
Alpha Chrome Red 3 B	CV	U723
Alpha Chrome Yellow C	CV	U724
Alphanol Black (V.M.)	C	A303
Alphanol Blue (V.M.)	C	257
Amaranth	C, etc.	168
Amaranth	CDCo	168
Amaranth B	C	168
Amaranth D	BK	168
Amaranth DE	B	168
Amaranth SA	tM	168
Amethyst Violet	K	686
Amido Acid Black B, 4 B, BS	A	220a
Amido-azo-benzene	Var.	31
Amido Azo Black	M	A413
Amido-azo-toluene	CDCo	68
Amido Black A 2 G	M	217f

Name	Manufacturer	Serial No.
Amido Black 10 B	M	217
Amido Black 4024	M	217f
Amido Blue B	M	U425
Amido Blue GGR	M	U426
Amido Dark Bottle Green B	M	U427
Amido Gallamine Blue	DH	638
Amido Naphthol Black 4 B	M	A414
Amido Naphthol Black RK	M	A415
Amido Naphthol Red 2 B	M	66a
Amido Naphthol Red 6 B	M	66
Amido Naphthol Red G	M	42
Amido Red BL	M	A416
Amido Yellow E	M	A417
Amine Black 4 B	A	U64
Amine Black 10 B	A	U65
Amine Black 4 BM	A	U66
Amine Black S 4 B	A	U67
Amine Black SL	A	U68
Amine Black Green B	A	U69
Amine Red	A	U70
Aniline Black	Var	922
Aniline Black 15908	B	922
Aniline Blue, Spirit Soluble	Var	521
Aniline Blue B	tM	521
Aniline Blue 2 B	A	521
Aniline Blue 3 B, RN	tM	521
Aniline Blue 6416	CG	521
Aniline Red B	I	512
Aniline Yellow	B	6
Aniline Yellow	Q	6
Anthosine B	B	U97
Anthosine 3 B	B	U98
Anthosine 5 B	B	U99
Anthracene Acid Black (V.M.)	C, etc.	277
Anthracene Acid Blue (V.M.)	C	A311
Anthracene Acid Brown	...	221
Anthracene Acid Brown B	M, C	492
Anthracene Acid Brown G, R	C	221
Anthracene Acid Green	G	U650
Anthracene Acid Red 3 B	...	355
Anthracene Black FF	C	A312
Anthracene Blue	Var	800
Anthracene Blue 3 G	M	800a
Anthracene Blue SWG	B	790a
Anthracene Blue SWGG, SWR	B	790a
Anthracene Blue SWX	B	790
Anthracene Blue WB, WG	B	800
Anthracene Blue WGG	B	801
Anthracene Blue WN	B	790a
Anthracene Blue WR, W 3 R	B	789
Anthracene Blue WG new	B	802
Anthracene Blue Black (V.M.)	C	181a
Anthracene Brown	B	782
Anthracene Brown G, R	By	782a
Anthracene Brown RH	H	782
Anthracene Brown VV	By	782a
Anthracene Brown SW	B	782
Anthracene Chromate Brown (V.M.)	C	A318
Anthracene Chromate Green FF	C	865
Anthracene Chromate Yellow	C	A322
Anthracene Chrome Blue (V.M.)	C	A313
Anthracene Chrome Black (V.M.)	C	185
Anthracene Chrome Black FF ex	C	185
Anthracene Chrome Brown	C	A323
Anthracene Chrome Green	C	A325
Anthracene Chrome Red (V.M.)	C	A326
Anthracene Dark Blue W	B	790b
Anthracene Direct Green	C	U274
Anthracene Red	By, I	355
Anthracene Red WB	B	355
Anthracene Red 10430	I	355
Anthracene Violet	I	599
Anthracene Yellow	By	773
Anthracene Yellow (V.M.)	C	177a
Anthracene Yellow C	By, etc.	294
Anthracene Yellow C	BK	294
Anthracene Yellow G	I	773a
Anthracene Yellow RN, 3 RN	M	58b
Anthrachrome Red A	L	A501
Anthracite Black	C	267
Anthracyanine S, SR	...	627
Anthracyl Blue SWR	CV	A726
Anthracyl Chrome Blue 2 B	tM	A524
Anthracyl Chrome Blue D	tM	A525
Anthracyl Chrome Brown D	WD	154
Anthracyl Chrome Green A, D	WD	91
Anthraflavone G	B	759
Anthranol Green B	WD	U540
Anthraquinone Black	B	749
Anthraquinone Blue SR	B	861
Anthraquinone Blue Green BXO	B	863
Anthraquinone Green GXNO, GX	B	864
Anthraquinone Violet	B	853
Anthrarubine 395	K	U305
Apollo Red B	G	54
Apollo Red G	G	54
Archil Substitute V	P	52
Archil Substitute 3 VN	P	53
Artificial Silk Black R	By	U216
Artificial Silk Black G	By	U215
Auracine G	By	494
Auramine	Var	493
Auramine G	I, B	494
Auramine G	tM, G	494
Auramine N	S	493
Auramine O	By, I	493
Auramine OO	G	493
Auramine OO 3, OO 4	K	493
Auramine OOD	B, K	493
Auramine OOP	I	493
Auramine OEA	B	493
Auramine 23112	K	493
Auramine base	K	493
Aurine	B, etc.	555
Auro Flavine KR	M	609c
Auronal Black	tM	722
Auronal Black 3 A, 4 A	G	722a
Auronal Black 4 A, 4 G, 5 G	tM	722a
Auronal Black B	tM	727
Auronal Black N 2 R	tM	722
Auronal Black 3	tM	722a
Auronal Blue D	tM	S137
Auronal Green TA	tM	S138
Auronal Orange R	tM	S140
Auronal Orange S	tM	S139
Aurophosphine G, 4 G	A	606a
Austrian Black	Q	U785
Autogene Black	P	732
Autogene Black EEB	P	723
Autol Red BL	B	56
Autol Red RL, RLP	B	106
Azarine S	M	86
Azidine Blue B, BALG	CJ	410
Azidine Blue 3 B	CJ	391
Azidine Blue BAN	CJ	410

Name	Manufacturer	Serial No.
Azidine Blue BX	CJ	386
Azidine Blue 24574	CJ	410
Azidine Bordeaux G	CJ	313
Azidine Dark Brown	CJ	A454
Azidine Fast Orange ES	CJ	A455
Azidine Fast Scarlet 4 BS	CJ	281
Azidine Fast Sacrlet 7 BS	CJ	282
Azidine Fast Scarlet E 4 BS	CJ	A456
Azidine Fast Scarlet GGS	CJ	280
Azidine Orange G	CJ	392
Azidine Sky Blue FF	CJ	424
Azidine Yellow CP	CJ	304
Azidine Wool Blue B	CJ	420
Azo Acid Black B 15	M	A418
Azo Acid Black 3 BL	M	A419
Azo Acid Black R	M	A420
Azo Acid Black TL II	M	A421
Azo Acid Blue	M	63
Azo Acid Blue B	K, M	63
Azo Acid Blue B	S	63
Azo Acid Blue 2 G	By	63a
Azo Acid Brown 26049	By	A151
Azo Acid Magenta G	M	64b
Azo Acid Red B	M	64
Azo Acid Red 5 B	M	64a
Azo Acid Red BA	M	64
Azo Acid Rubine	WD	163
Azo Acid Rubine (V.M.)	K	163
Azo Acid Rubine 2 B	Var.	168
Azo Acid Violet	By	229
Azo Acid Violet A 2 B, AL	By	229
Azo Acid Yellow	A	141
Azo Alizarin Black I	DH	292
Azo Alizarin Bordeaux W	DH	291
Azo Alizarin Brown I	By	A152
Azo Archil R	A	44
Azo Black O	M	A422
Azo Black Blue B, R	GrE	381
Azo Blue	By, etc.	377
Azo Bordeaux	Sch	112
Azo Brown V	M	160a
Azo Cardinal G	A	50
Azo Carmine	B	673
Azo Carmine	Var	672
Azo Carmine B	B	673
Azo Carmine BX	B	673
Azo Carmine G	B	672
Azo Carmine GX	B	672
Azo Cerise M, 1618	K	A389
Azo Chrome Blue B	...	164
Azo Chrome Blue R	K	163b
Azo Chromine	G	84
Azo Coccine 2 R	A	77
Azo Cochineal	By	95
Azo Coralline	WD	65
Azo Coralline L	WD	65
Azo Corinth	GrE	481
Azo Crimson L	...	65
Azo Crimson S	By	A153
Azo Eosine	By, etc.	94
Azo Fast Blue (V.M.)	C	A329
Azo Fast Violet	C	A332
Azo Flavine CX	B	141a
Azo Flavine FF, 3 G	B	141a
Azo Flavine GX, 3 R	B	141a
Azo Flavine 3 R	tM	140
Azo Flavine 2 RNH, RX	B	141a
Azo Flavine RS	B	140
Azo Flavine S	B	141
Azo Flavine SGR	B	141a
Azo Fuchsine B	By	71
Azo Fuchsine 6 B	By	147
Azo Fuchsine G, 4 G	By	146
Azo Fuchsine GN	By	147
Azo Galleine	G	62
Azo Green	By	510
Azo Indigine 6 B	AW	A537
Azo Indigine S	AW	A538
Azo Indigine 419, 420	K	A390
Azo Magenta 6 BX	B	A 67
Azo Magenta G	CV	146
Azo Magenta RS	B	A68
Azo Mauve B	GrE	382
Azo Merino Black	C	A333
Azo Milling Yellow 5 G	GrE	A457
Azomine Black FF	CV	A727
Azomine Fast Yellow AL	CV	A728
Azomine Milling Black N	CV	A729
Azomine Yellow G	Q	U786
Azomine Yellow R	Q	U787
Azo Orange Rubine	M	A423
Azo Orseille 2 B	C	A334
Azo Orseille R	A	44
Azo Orseilline	FA	312a
Azophor Black S	M	408
Azophor Blue D	M	408
Azophor Orange MN	M	46
Azo Phosphine GO	M	60
Azo Red A	C, A	165
Azo Rhodine 2 B	S	A711
Azo Rubine	Sch	163
Azo Rubine (V.M.)	C, etc.	163
Azo Rubine A	tM	163
Azo Rubine S	GrE	163
Azo Rubine S	S	168
Azo Rubine SG	A	163
Azo Rubine WB	WB	163
Azotol C	C	239
Azo Turkish Red	GrE	115
Azo Violet	By	407
Azo Wool Black (V.M.)	C	A335
Azo Wool Blue (V.M.)	C	61
Azo Wool Violet (V.M.)	C	A336
Azo Wool Violet 415	K	A391
Azo Yellow	K, M	141
Azo Yellow	Var.	141
Azo Yellow	Sch	141
Azo Yellow 3 A, 3 AN	tM	141c
Azo Yellow A 5 W	Sch	141
Azo Yellow 3 G	tM	141
Azo Yellow I	I	141
Azo Yellow 3 Y	tM	141c
Azure Blue	K	U306
Azure Blue A, ASI	K	U306
Azurine B	I	520a
Azure Blue O, VS	K	U306
Basic Black TES	K	U307
Basic Blue BA	AW	U552
Basic Blue R	DH	677
Basic Gray	Q	U788
Basic Green Z	...	499
Basic Kraft Brown Y 2	B	U100
Basic Violet	Q	U789
Benzamine Azo Blue G	WD	337
Benzamine Brown 3 G	WD	476a
Benzamine Brown 3 GO	WD	476
Benzamine Pure Blue	WD	426
Benzamine Violet G	WD	326
Benzidine Pure	M	318
Benzine Black	C	U275
Benzine Blue	C	U276
Benzo Azo Red B	WD	A526
Benzoazurine (V.M.)	K	410
Benzoazurine G	A, etc.	410
Benzoazurine G	By, CG	410
Benzoazurine G	S, etc.	410

Name	Manufacturer	Serial No.
Benzoazurine 3 G	By, etc.	411
Benzoazurine R	By	410
Benzoazurine 3 R	GrE	385
Benzoazurine WB	WB	410
Benzo Black Blue G	By	459
Benzo Black Blue 5 G	By	460
Benzo Black Blue R	By	450
Benzo Blue 2 B	By	337
Benzo Blue 3 B	By	391
Benzo Blue BX	By	386
Benzo Blue RW	By	419
Benzo Bordeaux 6 B	By	A154
Benzo Brilliant Blue 2 GDN	BK	A442
Benzo Bronze E	By	A155
Benzo Bronze GC	By	A156
Benzo Brown B	By	487
Benzo Brown BX	By	490
Benzo Brown D 3 G	By	485a
Benzo Brown G	By	485
Benzo Brown 5 G, 2 GC, 3 GC	By	485a
Benzo Brown MC, NBX	By	485a
Benzo Brown 5 R	By	190
Benzo Brown RC, TR	By	485a
Benzo Chrome Black Blue B	By	A157
Benzo Chrome Brown B	By	A158
Benzo Chrome Brown BS	By	A159
Benzo Chrome Brown G	By	A160
Benzo Chrome Brown 5 G	By	A161
Benzo Chrome Brown R	By	A162
Benzo Copper Blue B	By	A163
Benzo Copper Blue 2 B	By	A164
Benzo Cyanine B	By	390
Benzo Cyanine 3 B	By	425
Benzo Cyanine R	By	336
Benzo Dark Brown	By	A165
Benzo Dark Green B	By	A166
Benzo Dark Green GG	By	A167
Benzo Deep Black SS	By	A168
Benzo Fast Black	G	A611
Benzo Fast Black L	By	A169
Benzo Fast Blue B, BN	By	456
Benzo Fast Blue FRL, 2 GL	By	456a
Benzo Fast Blue 4 GL, 2 L	By	456a
Benzo Fast Blue R	A	451
Benzo Fast Bordeaux 6 BL	By	A170
Benzo Fast Brown 3 GL	By	A171
Benzo Fast Brown RL	By	A172
Benzo Fast Eosine BL	By	A173
Benzo Fast Gray	By	A174
Benzo Fast Gray BL	By	A175
Benzo Fast Heliotrope BL	By	A176
Benzo Fast Heliotrope 4 BL	By	A177
Benzo Fast Heliotrope 5 RH	By	A178
Benzo Fast Heliotrope 2 RL	By	A179
Benzo Fast Orange 2 RL	By	A180
Benzo Fast Orange S	By	A181
Benzo Fast Orange WS	By	340a
Benzo Fast Pink 2 BL	By	297
Benzo Fast Red	By	332
Benzo Fast Red 8 BL, 9 BL, D	By	332
Benzo Fast Red FC	By	343
Benzo Fast Red GL, L	By	332
Benzo Fast Rubine BL	By	A183
Benzo Fast Scarlet (V.M.)	By	279
Benzo Fast Scarlet 4BS, 5BS	By	279
Benzo Fast Scarlet 8 BS, 8 BSN	By	279
Benzo Fast Scarlet GS	By	279
Benzo Fast Violet NC	By	327
Benzo Fast Violet R	By	327a
Benzo Fast Yellow 4 GL	By	296a
Benzo Fast Yellow 5 GL	By	296
Benzo Fast Yellow RL	By	296a
Benzoflavine O	GrF	605
Benzoform Blue B	By	A196
Benzoform Brown R	By	A197
Benzoform Orange G	A	U71
Benzoform Orange G	By	A198
Benzoform Red G	A	U72
Benzoform Red G	By	A199
Benzoform Red 2 GF	By	A200
Benzoform Scarlet B	By	A201
Benzoform Yellow R	By	A202
Benzo Gray S	By	447
Benzo Green BB	By	A184
Benzo Green C	By	A185
Benzo Green FF	By	A186
Benzo Green FFG	By	A187
Benzo Green G	By	A188
Benzoin Blue 5 GN, RH	BK	410
Benzoin Brilliant Blue GDN	BK	410
Benzoin Brown C	BK	477
Benzoin Fast Red AE	BK	194
Benzo Indigo Blue	By	452
Benzo New Blue 2 B	By	379
Benzo New Blue 5 B	By	379
Benzo New Red 4 B	By	A189
Benzo Olive	By	446
Benzo Orange R	By	340
Benzo Pure Yellow FF	By	A190
Benzopurpurin	AW	365a
Benzopurpurin	H	365
Benzopurpurin	I	365a
Benzopurpurin AM	By	365a
Benzopurpurin B	A, etc.	365
Benzopurpurin 4 B	A, etc.	363
Benzopurpurin 6 B	By, etc.	364
Benzopurpurin 10 B	A, etc.	405
Benzopurpurin 4 BM	A	363
Benzopurpurin 4 BN	BK	363
Benzopurpurin 4 BP	GrE	363
Benzopurpurin 4 BX	Q	363
Benzo Red 10 B	By	A191
Benzo Red 12 B	By	A192
Benzo Rhoduline Red B	By	A203
Benzo Rhoduline Red 3 B	By	A204
Benzo Rubine HW	By	A193
Benzo Rubine SC	By	A194
Benzo Scarlet	By	319
Benzo Scarlet BC	By	A195
Benzo Sky Blue	By	426
Benzo Violet	CR	517
Benzo Violet O	By	326
Benzo Violet R	By	326a
Benzoyl Pink	P	104
Benzyl Black B	I	A661
Benzyl Blue B	I	U651
Benzyl Bordeaux B, 17619	I	U652
Benzyl Green B	I	503
Benzyl Red	I	A662
Benzyl Violet	I	517
Benzyl Violet 4 B, 6 B, 10 B	I	517
Benzyl Violet 5 BN	I	517
Betamine Blue 8 B	...	541
Biebrich Acid Blue G	K	U308
Biebrich Acid Blue V	K	U309
Biebrich Acid Violet R	K	A392
Biebrich Patent Black	K	278
Bismarck Acid Brown	By	A205
Bismarck Brown	A, etc.	283
Bismarck Brown (V.M.)	C	283
Bismarck Brown EL	A	283
Bismarck Brown G	I	283
Bismarck Brown R	CV, etc.	284
Bismarck Brown 2 R, 2 RV	tM	284
Bismarck Brown Y	Sch	283

Name	Manufacturer	Serial No.
Bismarck Brown YS	tM	283
Bismarck Brown 53	Sch	284
Bismarck Brown 1568	CV	283
Black (V.M.)	CJ	U494
Black (V.M.)	H	U749
Black AJ	P	700a
Black BH	AW	U553
Black CBR	P	698
Black CE	H	U749
Black C 2 N	P	698
Black DX	H	U749
Black E	B	U101
Black HB	AW	U554
Black M	H	U749
Black N	H	U749
Black NSA	P	700a
Black RW, X	H	U749
Black soluble in fats	G	U605
Black soluble in oil	C	U277
Black Base BB	B	U102
Black Base S	B	U103
Black Black O	M	U428
Blue (V.M.)	H	U750
Blue AS	S	U695
Blue 3 BB	GrE	U502
Blue BS	P	539
Blue 5 BS	tM	U524
Blue BS 3 BB	GrE	U503
Blue BSJ	GrE	U504
Blue BSR	GrE	U505
Blue CA	I	U653
Blue CV	AW	U555
Blue DB	Q	U790
Blue DR	Q	U791
Blue DS	H	U750
Blue JB	C	U278
Blue N	S	U696
Blue PCN	DH	697
Blue PCV	G	U606
Blue RR	GrE	U506
Blue 3 R	tM	U525
Blue RS	P	537b
Blue 25	S	U697
Blue 26	S	U698
Blue 214	B	U104
Blue 1900 TC	DH	635
Blue 16519	L	U514
Blue 27071	By	U217
Blue for silk RN	P	537b
Blue (greenish) spirit soluble	M	521
Blue Black B	M	269b
Blue Black N	K	215
Blue Black O	M	269b
Blue Black for Half Wool G	By	U218
Blue Crystals 3035	K	U309
Blue Residue BW 6 M	K	U310
Boma Black BH	AW	U556
Boma Black BHX	AW	U557
Boma Pink	AW	U558
Boma Yellow BBF	AW	U559
Bordeaux	AW	168
Bordeaux extra	Sch	320
Bordeaux B	Var	112
Bordeaux BLA	tM	320
Bordeaux BR	BK	112
Bordeaux BX	By	237
Bordeaux COV	A	320
Bordeaux G	By, M	254
Bordeaux G	BK	112
Bordeaux R	BK,K	112
Bordeaux S	A	168
Bordeaux 5005	BK	112
Bordeaux Black	Q	U792
Brilliant Acid Blue A	A, By	545
Brilliant Acid Blue B, FF, L	By	545c
Brilliant Acid Blue V	By	543
Brilliant Acid Blue 25601	S	545c
Brilliant Acid Carmine B, BOO	GrE	66b
Brilliant Acid Green 6 B	By	503
Brilliant Acid Red G	K	U312
Brilliant Alizarin Blue	Var	667
Brilliant Alizarin Blue D 3 G	M	667
Brilliant Alizarin Blue D 6 G	M	667
Brilliant Alizarin Blue DRI	M	667
Brilliant Alizarin Blue R. & (V.M.)	By	667
Brilliant Alizarin Blue R	CR	667
Brilliant Alizarin Blue 3 R	By	667
Brilliant Alizarin Green	WD	657a
Brilliant Anthrazurol	B	U105
Brilliant Archil C	C	55
Brilliant Azo Acid Blue 3 G	S	63b
Brilliant Azure Blue VS	K	U313
Brilliant Azurine B, R, 5 R	By	416a
Brilliant Azurine 5 G	By,A,L	416
Brilliant Benzo Blue 6 B	By	424
Brilliant Benzo Green B	By	A207
Brilliant Benzo Violet B	By	A208
Brilliant Benzo Violet 2 R	By	A209
Brilliant Benzo Fast Violet 2 RL	By	A206
Brilliant Benzo Fast Violet BL	By	A206a
Brilliant Black	Var	272
Brilliant Black B	B, etc.	272
Brilliant Black 3 B, G	B	272
Brilliant Blue A	CV	U725
Brilliant Blue G	S	U699
Brilliant Blue GG	CV	U726
Brilliant Blue 217	Q	U793
Brilliant Blue 286	Q	U794
Brilliant Bordeaux SD	A	A1
Brilliant Brown 205	Q	U795
Brilliant Carmine CL	B	U106
Brilliant Carmine GG	B	U107
Brilliant Carmine L	B	U108
Brilliant Chrome Blue P	S	626
Brilliant Chrome Violet BD	By	549a
Brilliant Cloth Blue	K	189a
Brilliant Cochineal 2 R	C	81
Brilliant Congo G	A, L	316
Brilliant Congo R	A, L	370
Brilliant Congo R	By	370
Brilliant Congo R	S	370
Brilliant Congo Blue B	A	U73
Brilliant Congo Blue 5 R	A	U74
Brilliant Congo Violet R	A	U75
Brilliant Copper Blue BW	A	U76
Brilliant Copper Blue GW	A	U77
Brilliant Cotton Blue N	By	538
Brilliant Croceine (V.M.)	C	227
Brilliant Croceine 3 B, MOO	By	227
Brilliant Croceine 9 B	C	270
Brilliant Croceine 3 BA	By	227
Brilliant Croceine MD	GrE	227
Brilliant Croceine NZ	M	227
Brilliant Crimson	M	163
Brilliant Crimson N	M	163
Brilliant Delphine Blue B	K	U314
Brilliant Delphine Blue BS, VS	S	622
Brilliant Dianil Blue 6 G	M	541
Brilliant Dianol Red R	LW	358
Brilliant Diazine Blue 1230	K	U315
Brilliant Double Scarlet	BK	176b

Name	Manufacturer	Serial No.
Brilliant Fast Black	I	U654
Brilliant Fast Blue	AW	A539
Brilliant Fast Blue B	By	A210
Brilliant Fast Blue 3 BX	By	A211
Brilliant Fast Blue 2 G	By	A212
Brilliant Fast Blue 4 G	By	A213
Brilliant Fast Red G	B	162
Brilliant Fast Red P	By	A214
Brilliant Geranine B	By	118
Brilliant Glacier Blue	I	501
Brilliant Green	Var	499
Brilliant Green B	tM	495
Brilliant Green 6 B	...	499
Brilliant Green BN	tM	499
Brilliant Green D	C	499
Brilliant Green PND	GrE	499
Brilliant Green S	CJ	499
Brilliant Hessian Purple	L	302
Brilliant Indigo B	B	885
Brilliant Indigo BD	B	885
Brilliant Indigo 2 B, BBD	B	884
Brilliant Indigo 4 G	B	887
Brilliant Indigo G, GD, 4 GD	B	886
Brilliant Lake Red R	M	45
Brilliant Lanafuchsine (V.M.)	C	U280
Brilliant Milling Blue (V.M.)	C	U281
Brilliant Milling Blue B	K	U316
Brilliant Milling Green B	C	503
Brilliant Naphthol Blue	C	U282
Brilliant Orange G	A, By	339
Brilliant Orange O	M	70
Brilliant Orange R	M, etc.	79
Brilliant Orseille	C	55
Brilliant Orseille C	C	55
Brilliant Patent Blue A	K	U317
Brilliant Patent Blue A	M	545
Brilliant Phosphine	I	606b
Brilliant Phosphine G, 5 G	I	606
Brilliant Pink	S	571a
Brilliant Ponceau 5 R	By	169
Brilliant Pure Yellow 6 G	By	U219
Brilliant Purpurin 4 B	A, By	368
Brilliant Purpurin 10 B	A	368a
Brilliant Purpurin R	A, etc.	369
Brilliant Red R paste	...	45
Brilliant Rhodulin Red B	By	684b
Brilliant Rhodulin Violet	By	684a
Brilliant Safranine G	A	679
Brilliant Safranine R	Sch	684
Brilliant Scarlet (V.M.)	C	U283
Brilliant Scarlet AL	M	A424
Brilliant Scarlet NY 47	B	U109
Brilliant Scarlet R	BK	A443
Brilliant Scarlet 2 R	tM	A515
Brilliant Scarlet 3 R	Sch	169
Brilliant Scarlet 4 R, 4 RSP	tM	A516
Brilliant Scarlet 141113	B	U110
Brilliant Sky Blue 5 B	By	U220
Brilliant Sky Blue 6 B	...	424
Brilliant Sky Blue G	By	U221
Brilliant Sky Blue 5 G	By	541
Brilliant Sky Blue 8 G	By	U223
Brilliant Sulfonazurine R	By	361a
Brilliant Sulfon Red B, 5 B, 10 B	S	182
Brilliant Victoria Blue RB	I	559b
Brilliant Wool Blue B, FFR, G	By	562a
Brilliant Yellow	By	U224
Brilliant Yellow	Var.	303
Brilliant Yellow	tM	142
Brilliant Yellow C	Sch	303
Brilliant Yellow S	B, etc.	142
Bromofluoresceic Acid A 3 G	M	587b
Bromofluoresceic Acid BA, BL	M	587b
Bromofluoresceic Acid Crystals	M	587b
Bromo Indigo FB	By	881
Bromo Indigo Rathjen	...	879
Bromo Metanil Yellow	P	135
Brown	BK	U479
Brown A 1678	B	U111
Brown GC	G	U607
Brown PCC	DH	U596
Brown Y	H	283
Brown PCC	G	U607
Brown 43	S	U700
Brown 359	Lev	283b
Brown 37104	H	283
Buffalo Black AD	Sch	266
Buffalo Black 2 B	Sch	272
Buffalo Black 4 B	Sch	269
Buffalo Black 8 B, 10 B	Sch	261
Buffalo Black EA	Sch	268
Buffalo Black NB	Sch	217
Buffalo Black PY	Sch	220
Buffalo Black R	Sch	261
Buffalo Chrome Black BWN	Sch	275
Buffalo Cyanine R, 3 R	Sch	257
Buffalo Direct Blue G	Sch	410
Buffalo Direct Cardinal 7 B	Sch	405
Buffalo Direct Crimson B	Sch	313
Buffalo Direct Garnet R	Sch	312
Buffalo Direct Orange R	Sch	362
Buffalo Direct Orange Y	Sch	392
Buffalo Direct Red 4 B	Sch	363
Buffalo Direct Violet 4 R	Sch	375
Buffalo Direct Yellow CG	Sch	342
Buffalo Direct Yellow CRR	Sch	394
Buffalo Fast Blue B	Sch	189
Buffalo Fast Blue R	Sch	188
Buffalo Fast Crimson G	Sch	64
Buffalo Fast Crimson R	Sch	66
Buffalo Fast Fuchsine B	Sch	147
Buffalo Flamine B	Sch	94
Buffalo Flamine G	Sch	95
Buffalo Rubine	Sch	110
Butter Yellow	A, etc.	32
Cachou (V.M.)	Lev	U731
Cachou de Laval	P	706
Calcutta Black D	H	U751
Calcutta Blue	S	626
Calcutta Blue 2	S	U701
Caledon Blue R	...	842
Caledon Green	...	765
Caledon Purple	...	763
Caledon Violet	...	766
Candle Blue	K	U318
Candle Violet	K	U319
Canelle AL	B	606
Capri Blue GON	By, L	620
Capri Green BN	L	620a
Carbazole Wool Green	C	U284
Carbide Black	I	462f
Carbide Black E, EX, SX	I	462f
Carbide Fast Black GF	I	462f
Carbide Violet V	I	462g
Carbindol Blue R	...	748
Carbon Black (V. M.)	K	458
Carbon Black 4 B	M	272
Cardinal 3 B	H	512
Cardinal Red J	H	161
Carmine Blue A	AW	U560
Carmine special	P	U592

Name	Manufacturer	Serial No.
Carmine Blue V	K	U320
Carmine Brilliant Blue	AW	U561
Carmine Naphth Garnet	DH	106
Carmoisine	A, S	163
Carmoisine B	By	163
Carmoisine 3 B	By	163a
Carmoisine 6 B, R	H	163a
Carmoisine L, WS	...	163
Carpet Red B, BT, R	K	U321
Carthamine 6 A, B	tM	573a
Cashmere Black 3 BN	By	A215
Cashmere Black MCS	H	A733
Cashmere Black V	By	A216
Cashmere Blue TG	By	A217
Celestial Blue	WD	U541
Celestine Blue B	By	641
Cerasine Brown AN	C	U285
Cerasine Dark Red I, II	C	223a
Cerasine Orange G	C	35
Cerasine Red 56 I, 56 II	C	223
Ceres Blue 4	By	U225
Ceres Brown 3	By	U226
Ceres Brown 4	By	U227
Ceres Orange 3	By	U228
Ceres Red 3	By	U229
Ceres Red 6	By	U230
Cerise DN, DIV	B	512
Cerise M	tM	512
Cerise N	C	512
Ceroflavine	B	U112
Cerotine Scarlet G	CJ	34b
Chicago Blue B	A	423
Chicago Blue 4 B	A	422
Chicago Blue 6 B	A	424
Chicago Blue R	A, By	388
Chicago Blue 2 R	A	384
Chicago Blue 4 R	A	324
Chicago Blue RW	A	419
Chicago Blue new	A	422a
Chicago Orange G	G	15
Chicago Red 111	G	A612
China Blue	A	539
Chinaldine Yellow	...	613
Chloramine Black BH	S	469
Chloramine Black BH	S	333
Chloramine Black EXD, FF	S	469a
Chloramine Black HW	S	473
Chloramine Black N	S	469
Chloramine Blue 2 B	S	337
Chloramine Blue 3 B	S	471a
Chloramine Blue 3 G	S	471
Chloramine Blue BXR	S	386
Chloramine Blue HW	S	472
Chloramine Brilliant Red 8 B	S	358
Chloramine Brown G	By	A218
Chloramine Dark Green B	S	470a
Chloramine Fast Red F, FF	S	343
Chloramine Fast Yellow B	By	617
Chloramine Green B	S	470
Chloramine Green G	S	475
Chloramine Orange	S	11
Chloramine Orange G	By	11
Chloramine Pure Blue	S	471b
Chloramine Red B, 3 B	S	319
Chloramine Red 8 B, 8 BS	By	358
Chloramine Sky Blue Acone	S	426
Chloramine Sky Blue 6 B, FF	S	424
Chloramine Violet	By	A220
Chloramine Violet N	S	327
Chloramine Violet R	By	A221
Chloramine Yellow	By, etc.	617
Chloramine Yellow DB, FF	By	617
Chloramine Yellow G	S	617
Chloramine Yellow GG, HW, M	By	617
Chloramine Yellow M	S	617
Chloramine Yellow RC	By	617
Chloranisidine Scarlet	M	97
Chloranthrene Yellow G	...	849
Chlorantine Blue BB	I	A663
Chlorantine Brown BB	I	A664
Chlorantine Brown R	I	A665
Chlorantine Brown 15521	I	A666
Chlorantine Brown 15895	I	A667
Chlorantine Fast Blue RL	I	451
Chlorantine Lilac B	I	A668
Chlorantine Lilac BB	I	A669
Chlorantine Orange TR	I	A670
Chlorantine Orange 11323	I	A671
Chlorantine Pure Blue	I	A672
Chlorantine Red	I	358
Chlorantine Violet BB	I	A673
Chlorantine Yellow JJ	I	617
Chlorazol Blue GBDS	H	417
Chlorazol Blue 3 G	H	417
Chlorazol Blue R	H	417
Chlorazol Brilliant Blue 3 B, 10 B	H	417a
Chlorazol Brilliant Blue 14 B, F	H	417a
Chlorazol Brilliant Bordeaux RH	H	A734
Chlorazol Brilliant Green G	H	A738
Chlorazol Brown G	H	A735
Chlorazol Brown M	H	A736
Chlorazol Brown MAS	H	A737
Chlorazol Catechine B	H	A739
Chlorazol Drab RH	H	A740
Chlorazol Fast Blue RH	H	A741
Chlorazol Fast Bordeaux B	H	A742
Chlorazol Fast Red 10 B	H	A743
Chlorazol Fast Scarlet RH	H	A744
Chlorazol Fast Yellow A	H	A745
Chlorazol Fast Yellow AF	H	A746
Chlorazol Fast Yellow AG	H	A747
Chlorazol Fast Yellow BS	H	A748
Chlorazol Fast Yellow R	H	A749
Chlorazol Green B	H	474
Chlorazol Green G	H	A750
Chlorazol Orange 2 R	H	340
Chlorazol Red A	H	A751
Chlorazol Sky Blue FF	H	A752
Chlorazol Sky Blue FFS	H	A753
Chlorazol Violet B	H	A754
Chlorazol Violet 3 B	H	A755
Chlorazol Violet R	H	A756
Chlorophenine	ClCo	17
Chocolate Brown	AW	U568
Chocolate Brown G	B	U113
Chocolate Brown R	B	U114
Chromal Blue G, GC	G	552
Chromal Dark Blue K	G	552a
Chromal Fast Brown G	G	U608
Chromal Fast Brown R	G	U609
Chromanil Black BF	A	A2
Chromanil Black FF	A	A3
Chromanil Blue R	A	A4
Chromanil Brown 2 G	A	A5
Chromazine Blue G	M	U429
Chromazone Blue R	G	130
Chromazone Red (new), A	G	129
Chrome Acid Black	I	U655
Chrome Acid Black RSI	I	U656
Chrome Azurol S	G	554
Chrome Black	WD	275a
Chrome Black BA	Q	A765

Name	Manufacturer	Serial No.
Chrome Black A	CG	275a
Chrome Black DF	AW	275a
Chrome Black DF	M	A425
Chrome Black FPP, G	AW	275a
Chrome Black I	H	275a
Chrome Black LV	K	U322
Chrome Black M, Z	H	275a
Chrome Black 2841	K	U322
Chrome Black 57006	H	275a
Chrome Blue	By	567
Chrome Blue ATX	B	163b
Chrome Blue B	WB	626
Chrome Blue 2 B, FBX	BK	163b
Chrome Blue G	Q	163b
Chrome Blue R	AW	163
Chrome Blue R	WB	599
Chrome Blue RX	B	163b
Chrome Blue Black B	K	U323
Chrome Bordeaux	By	550
Chrome Brown	AW	158a
Chrome Brown CS	K	158a
Chrome Brown P	P	90
Chrome Brown RR	G	158
Chrome Brown RVV	G	158
Chrome Brown 414	Lev	158a
Chrome Brown 2813	K	158a
Chrome Deep Black A	G	275b
Chrome Deep Black A	tM	275
Chrome Deep Black G	G	275b
Chrome Deep Black G	tM	275
Chrome Fast Black	G	275
Chrome Fast Black A	CG	181c
Chrome Fast Black B	I	275c
Chrome Fast Black F	A	A6
Chrome Fast Black F	...	275
Chrome Fast Black FW	I	275c
Chrome Fast Black P4B	A	A7
Chrome Fast Black PF	A	A8
Chrome Fast Black PON	CG	181c
Chrome Fast Black PT	A	A9
Chrome Fast Black PV	...	157
Chrome Fast Black PWBL	I	181
Chrome Fast Black PWRR	I	181
Chrome Fast Black 12172	CG	181c
Chrome Fast Blue B	B	U115
Chrome Fast Blue 4 B	A	U78
Chrome Fast Blue R	I	U657
Chrome Fast Blue 13366	I	U658
Chrome Fast Brown A	I	A674
Chrome Fast Brown BC	I	A675
Chrome Fast Brown G	I	A676
Chrome Fast Brown R	A	A10
Chrome Fast Brown TP	By	U231
Chrome Fast Brown TV	I	A677
Chrome Fast Brown V	I	A679
Chrome Fast Brown 12684	I	A678
Chrome Fast Brown 15823	I	A680
Chrome Fast Cyanine G	I	A681
Chrome Fast Garnet BL	A	U79
Chrome Fast Green G	I	A682
Chrome Fast Green GL	I	A683
Chrome Fast Green 16394	I	A684
Chrome Fast Orange R	I	A685
Chrome Fast Orange RD	By	U232
Chrome Fast Pure Blue BX	I	551
Chrome Fast Red G	A	A11
Chrome Fast Violet B	I	A686
Chrome Fast Yellow BN	CG	177d
Chrome Fast Yellow G	A	96a
Chrome Fast Yellow 2 G	A	96
Chrome Fast Yellow GG, 5 G	I	96a
Chrome Fast Yellow GA, O	I	96a
Chrome Fast Yellow R, 2 R	A	177
Chrome Gallus Brown RR	G	158a
Chrome Green	By	509
Chrome Green (V. M.)	K	U324
Chrome Green C	K	U324
Chrome Green G	L	U515
Chrome Heliotrope	DH	625
Chrome Leather Black E	B	U116
Chrome Leather Black E	By	U233
Chrome Leather Black E	S	U702
Chrome Leather Black EA	B	U117
Chrome Leather Black I	WD	U542
Chrome Leather Black M	By	U234
Chrome Leather Brown R	S	U703
Chrome Orange GR	By	U235
Chrome Patent Green N	K	219
Chrome Red 2593	K	U325
Chrome Violet	By	549
Chrome Violet	G	557
Chrome Violet Brown 9457	K	U326
Chrome Violet S for printing	G	557
Chrome Yellow	By	177
Chrome Yellow	I	177e
Chrome Yellow D, DF	By	177
Chrome Yellow G, GG	S	177e
Chrome Yellow R	AW	177e
Chrome Yellow R	By	177
Chrome Yellow SM, 2501	K	A393
Chromine G	K	614
Chromine RR	S	614a
Chromine Blue	A	U562
Chromine Blue B	AW	U563
Chromine Brown R	AW	U564
Chromine Brown V	AW	U565
Chromine Fast Blue S	AW	U566
Chromine Violet 2 R	AW	U567
Chromocitronine R	DH	140a
Chromocyanine B, V	DH	631
Chromogene I	M	777
Chromogene Violet B	M	U430
Chromopurpurin II	DH	U597
Chromotrope 2 B	M	57
Chromotrope 6 B	M	67
Chromotrope 8 B	M	171
Chromotrope 10 B	M	114
Chromotrope DW	M	57a
Chromotrope F 4 B	M	164
Chromotrope 2 R	M	40
Chromotrope S	M	57a
Chromoxane Blue R	By	U236
Chromoxane Violet 5 B	By	U237
Chrysamine G	By, etc.	342
Chrysamine K	S	342
Chrysamine R	By, I	394
Chrysobarine	tM	304c
Chrysobarine R	tM	304c
Chrysoidine	Var	33
Chrysoidine A	B	33
Chrysoidine AR	tM	34
Chrysoidine C 2 E	P	33
Chrysoidine E	B	33
Chrysoidine GS	I	33
Chrysoidine 3 N	tM	33
Chrysoidine R	Var	34
Chrysoidine R	C, DH	69
Chrysoidine 3 R	Sch	34
Chrysoidine RD	CV	33
Chrysoidine RE	P	34
Chrysoidine RG	...	34
Chrysoidine RL, RLE	B	34
Chrysoidine T base	B	34a
Chrysoidine Y	Var	33

Name	Manufacturer	Serial No.
Chrysoidine 2 Y	tM	33
Chrysoidine 46803	A	33
Chrysoidine Base	K	33
Chrysoidine crystals	Sch	33
Chrysoine	Var	143
Chrysolarine A	tM	U526
Chrysoline	G, S, P	586
Chrysophenine	I, S	304
Chrysophenine G	Var	304
Chrysophenine GOO	L	304
Chrysophenine R, W	By	304a
Chrysophenine III	AW	304
Chrysophenine 190	K	304
Ciba Blue B	I	880
Ciba Blue 2 B, 2 BD	I	881
Ciba Blue G, G 2 B	I	882
Ciba Bordeaux B	I	915
Ciba Gray B, G	I	899
Ciba Green G	I	891
Ciba Heliotrope B	I	897
Cibanone Black B, BG, 2 G	I	794
Cibanone Blue 3 G	I	793
Cibanone Brown B, V	I	868
Cibanone Green G	I	792a
Cibanone Olive B, G	I	792b
Cibanone Orange R	I	792
Cibanone Yellow R	I	795
Ciba Orange G	I	911
Ciba Pink R	I	910a
Ciba Red R	I	908
Ciba Red B	I	909
Ciba Red G	I	906
Ciba Scarlet G	I	907
Ciba Violet B	I	901
Ciba Violet 3 B	I	900
Ciba Violet R	I	901
Ciba Yellow G	I	890
Cinnabar Scarlet BF	BK	299
Cinnabar Scarlet G, R	BK	300
Citronine GOO	L	141
Citronine GOOO, 2 ROOOO	GrE	140
Claret NY Z 1413	B	U118
Claret Lake BL	By	U238
Claret Red	B	U119
Claret Red	H	A757
Claret Red B, BO	M	112a
Claret Red SS	B	U120
Claret Red X	M	112a
Clayton Cloth Red	ClCo	193
Clayton Yellow	ClCo	198
Cloth Blue 1769, 1770	K	U327
Cloth Fast Black B	I	U659
Cloth Fast Blue B	I	693
Cloth Fast Blue GTB	I	U661
Cloth Fast Blue R	I	257
Cloth Fast Red R	I	484
Cloth Red B	By	233
Cloth Red B	GrE, K	236
Cloth Red BB	K	A394
Cloth Red B, 2 B	WD	236
Cloth Red 3 B	By	231
Cloth Red BA	A	236
Cloth Red BC	By	223a
Cloth Red BO	GrE	236
Cloth Red G	By	224
Cloth Red G	By, GrE	234
Cloth Red GA	A	234
Cloth Red 3 GA	A	230
Cloth Red GFL, GL	A	234
Cloth Red O	M	236
Cloth Red 1769, 2586	K	A394
Cloth Scarlet C, G	K	246
Cloth Scarlet R	K	252
Cloth Scarlet 2584	K	U327a
Cloth Yellow R	GrE	A458
Cocceine Orange	P	227a
Coccine 2 BG, 3 BG	A	167
Coccinine B	M	101
Cochineal	P	81b
Cochineal Red A	B	169
Cochineal Scarlet B	WD	95
Cochineal Scarlet 4 R	Sch	78
Cœrulein B	M	600
Cœrulein I	B	601
Cœrulein MS powder	DH	601
Cœrulein S	B, etc.	601
Cœrulein SL powder	BD	601
Cœrulein SW	B, By	601
Columbia Black	A	436
Columbia Black B	A	455
Columbia Black EA	A	455a
Columbia Black FF, FB, F2B	A	436
Columbia Black R	A	453
Columbia Black WA	A	455a
Columbia Black Green D	A	465
Columbia Blue G, GM	A	387
Columbia Blue R	A	325
Columbia Bordeaux B	A	U80
Columbia Brown M	A	A12
Columbia Brown R	A	A13
Columbia Catechine 3 B	A	U81
Columbia Catechine G	A	U82
Columbia Catechine O	A	U83
Columbia Catechine R	A	U84
Columbia Fast Black D	A	U86
Columbia Fast Black FF	A	U87
Columbia Fast Black G	A	U88
Columbia Fast Black V	A	U89
Columbia Fast Blue 2 G	A	A16
Columbia Fast Blue R	A	A17
Columbia Fast Red F	A	343
Columbia Fast Scarlet 4 B	A	279
Columbia Green	A	478
Columbia Green B, 3 B, G	A	478
Columbia Orange R	A	A14
Columbia Violet R	A	A15
Columbia Yellow	A	617
Columbo Blue 4 R	I	U663
Coomassie Acid Blue R	BD	188
Coomassie Black B	Lev	433
Coomassie Blue Black	Lev	217
Coomassie Navy Blue	Lev	434
Coomassie Navy Blue 2 RNX	BD	252
Coomassie Union Blacks	Lev	461
Coomassie Wool Black D	Lev	266
Coomassie Wool Black S	Lev	244
Coomassie Wool Black R	Lev	243
Concentrated Blue BB	H	U752
Concentrated Cotton Blue B, 2	M	539
Congo	A	307
Congo 4 R	A	374
Congo Blue 2 B	By	412
Congo Blue 3 B	A	391
Congo Brown	Var	477
Congo Brown G	A, Lev	477
Congo Brown R	A, Lev	490
Congo Corinth B	Var	375
Congo Corinth G	Var	312
Congo Fast Blue B	A	456
Congo Fast Blue R	A	451
Congo Magenta	K	A395
Congo Magenta 3616	K	A395
Congo Orange G	Var	315
Congo Orange R	A, L	373
Congo Orange R, RG	By	373

Name	Manufacturer	Serial No.
Congo Red	Var	307
Congo Red 4 B	Sch	307
Congo Red 4 R	By	374
Congo Rubine	Var	313
Congo Rubine G	S	313
Congo Rubine Z	BK	313
Congo Rubine 8714	CG	313
Coreine AR, AB	DH	646
Coreine 2 R	DH	641
Corioflavine G,GG,GOOO,R	GrE	609e
Coriphosphine OS, OX	By	606e
Corvan Black BG	B	A69
Corvan Black T	B	A70
Corvoline BT	B	U121
Cotton Black	S	462e
Cotton Black	WD	738
Cotton Black (V. M.)	K	A396
Cotton Black 3 B	B	A71
Cotton Black BGX	B	A72
Cotton Black BNX	B	A73
Cotton Black BT	Q	462e
Cotton Black CC, CT	Lev	462e
Cotton Black CK	K	A396
Cotton Black E	B	463
Cotton Black GB	K	A396
Cotton Black GS, RS	S	462e
Cotton Black PF	B	A75
Cotton Black RW	B	462b
Cotton Black UG	K	A396
Cotton Black V, Y	Lev	462e
Cotton Black 4	B	A74
Cotton Blue	WD	538
Cotton Blue	...	649
Cotton Blue (V. M.)	Lev	538a
Cotton Blue B	K	U328
Cotton Blue BCB	CG	U490
Cotton Blue BCB	Q	538a
Cotton Blue BR	K	U328
Cotton Blue BSJ	GrE	538a
Cotton Blue CC	K	U328
Cotton Blue G	M	539
Cotton Blue N	B	649
Cotton Blue OOO	Q	538a
Cotton Blue R, RN	B	649
Cotton Blue 5190	BK	538a
Cotton Blue Double cone	...	539
Cotton Brown	WD	737
Cotton Brown (V. M.)	C	490
Cotton Brown B	K	U329
Cotton Brown B	Lev	490a
Cotton Brown CNP	B	U122
Cotton Brown CR	Q	490a
Cotton Brown FS	Lev	490a
Cotton Brown 4 G	K	U329
Cotton Brown M	S	490a
Cotton Brown O, 2 R	K	U329
Cotton Brown 3 R	Lev	490a
Cotton Brown RN	B	U123
Cotton Brown T	I, S	490a
Cotton Brown V	K	U329
Cotton Brown 100, 137, 153	Lev	490a
Cotton Corinth G	B,GrE	312
Cotton Cutch 21 A	Lev	A732
Cotton Dark Green B, N	K	U330
Cotton Dark Green 138	Lev	U732
Cotton Fast Red 4 BSP, 4 BX	B	363
Cotton Green	K	U331
Cotton Green A, 88 A, 105 A, B	Lev	U733
Cotton Green D	S	A714
Cotton Green 2 G	L	U516
Cotton Marine Blue	K	U332
Cotton Milling Black	B	U124
Cotton Olive	Lev	U734
Cotton Orange	K	U333
Cotton Orange	Q	210c
Cotton Orange	S	34d
Cotton Orange (V. M.)	Lev	210a
Cotton Orange FB, GK	K	U333
Cotton Orange G	B, S	192
Cotton Orange R	B	210
Cotton Orange RR, R 2 O	K	U333
Cotton Orange 16737	I	34e
Cotton Orange Brown (V.M.)	Lev	210b
Cotton Pink B	B	U125
Cotton Ponceau	BK	300
Cotton Pure Blue B	A	U1
Cotton Purple 5 BN	B	366
Cotton Red	B	363
Cotton Red	tM	307
Cotton Red A	C	307a
Cotton Red 65 A, 201 A	Lev	307a
Cotton Red B	S	365
Cotton Red 4 B	B	363
Cotton Red 4 B	GrE	307
Cotton Red 8 BN	CG	307a
Cotton Rubine	B	313
Cotton Ruby	Lev	313a
Cotton Scarlet	B	227
Cotton Scarlet	K	U334
Cotton Scarlet	Q	227b
Cotton Scarlet NP, NPX	B	227
Cotton Violet 43 A	Lev	U735
Cotton Violet 2 B	Q	U796
Cotton Violet 5 B	Q	U797
Cotton Violet R	R	U798
Cotton Violet X	Lev	U735
Cotton Yellow	Q	199b
Cotton Yellow CH	I	304
Cotton Yellow G	B	296
Cotton Yellow GI, GX	B	296
Cotton Yellow R	B	199
Cresol Black (V. M.)	GrE	U510
Cresotine Yellow G	GrE,M	351
Cresotine Yellow GOO	GrE	351
Cresotine Yellow R	GrE	395
Cresyl Blue BBS, RRN	L	621
Cresyl Fast Violet 2 B	L	U517
Crimson BBT	By	163a
Crimson Benine G	AW	U569
Croceine AZ	C	225
Croceine B	Sch	226
Croceine 3 B	Sch	235
Croceine Orange	Var	37
Croceine Orange G	Var	37
Croceine Orange R	Sch	70
Croceine Orange X	C	37
Croceine Orange Y	Sch	37
Croceine Scarlet (V. M.)	K	169a
Croceine Scarlet 3 B	By, etc.	249
Croceine Scarlet 7 B, 8 B	By	255
Croceine Scarlet 10 B	By	249a
Croceine Scarlet 8 BL	K	255
Croceine Scarlet 2 BX	By	167
Croceine Scarlet 3 BX	By, K	167
Croceine Scarlet MO	WD	A527
Croceine Scarlet MOO	Sch	227
Croceine Scarlet MOO	WD	A528
Croceine Scarlet O	K	251
Croceine Scarlet OO	K	251
Cross Dye Black (V. M.)	H	720H
Cross Dye Blue FR	H	S174
Cross Dye Brown 2 D	H	S175
Cross Dye Brown 4 R	H	S176
Cross Dye Drab N	H	S177
Cross Dye Green G	H	S181

Name	Manufacturer	Serial No.
Cross Dye Yellow D	H	S178
Cross Dye Yellow R	H	S179
Cross Dye Yellow Y	H	S180
Crumpsall Direct Fast Brown B	Lev	444
Crumpsall Direct Fast Brown O	Lev	445
Crumpsall Direct Fast Red R	Lev	341
Crumpsall Yellow	Lev	178
Crystal Orange	...	38
Crystal Orange 2 G	Var	38
Crystal Ponceau	B, etc.	113
Crystal Ponceau 6 R	A, BK	113
Crystal Scarlet	WD	U543
Crystal Scarlet 6 R	C	U286
Crystal Violet	Var	516
Crystal Violet 5 BO	...	516
Crystal Violet 6 B	A	516
Crystal Violet CV	B	516
Crystal Violet 484	I	516
Cumidine Scarlet	Sch	83
Cupranil Brown R	I	A689
Cupranil Brown	I	A687
Cupranil Brown G	I	A688
Cupranil Brown 12366	I	A690
Cupranil Brown 15596	I	A690
Cupranil Brown 15903	I	A690
Curcumeine	A, BK	140
Curcumeine GG	BK	140
Curcumeine S	A	140
Curcumine	tM, G	142
Curcumine L, LC	G	142
Curcumine 8000	L	9
Curcuphenine	ClCo	16
Curch Brown	AW	A540
Curch Brown D	M	A426
Cutch Brown R	S	A715
Cutch Brown 11759	I	A691
Cyanthracene Blue 3 B	CV	U727
Cyanthracene Blue 2 BL	CV	U728
Cyanthracene Yellow S	CV	U729
Cyanthrol BGA, G, 3 GO	B	860
Cyananthrol R, RB	B	859
Cyananthrol RBA, RBX	B	859
Cyananthrol RXO, RBY	B	859
Cyanazurine	DH	630
Cyanine B	A, M	544
Cyanine BF	A	544
Cyanine Blue	CV	544a
Cyanine Blue	tM	U527
Cyanogen Blue 13623	I	U664
Cyanol (V. M.)	C	546
Cyanol Green (V. M.)	C	566b
Cyanol Fast Green B	C	566
Cyanosine B	I	598
Cyanosine spirit soluble	M,K,S	594
Cyprus Green B	A	A19
Dark Navy Blue 2035	Lev	537a
Dark Purple (printing paste)	Lev	U736
Deep Black D	tM	U528
Deep Fat Black Color	A	U2
Delphine Blue B	S, By	622
Deltapurpurin	I	366
Deltapurpurin 3 B	AW	366a
Deltapurpurin 5 B	Var	366
Deltapurpurin 7 B	Lev	367
Develop Black	WD	333d
Develop Black NZ	Q	333d
Developed Black B	AW	U570
Developed Black BH	AW	333
Developed Black N	AW	U571
Developed Black R	AW	U572
Developed Black W	AW	U573
Developed Blue GG	AW	U574
Developed Brown M	AW	U575
Developed Green F	AW	U576
Diamine Aldehyde Blue	C	A338
Diamine Aldehyde Scarlet	C	A339
Diamine Azo Blue	C	A340
Diamine Azo Bordeaux B	C	A341
Diamine Azo Scarlet (V.M.)	C	A342
Diamine Black (V. M.)	C	333b
Diamine Black BH	C	333
Diamine Black BO	C	403
Diamine Black HW	C	473
Diamine Black RO	C	328
Diamine Blue Black E	C	402
Diamine Blue (V. M.)	C	384a
Diamine Blue 2 B	C	337
Diamine Blue 3 B	C	391
Diamine Blue BX	C	386
Diamine Blue C 2 R	C	384
Diamine Blue 6 G	C	271
Diamine Blue 3 R	C	401
Diamine Blue RW	C	419
Diamine Brilliant Blue G	C	418
Diamine Brilliant Bordeaux R	C	319a
Diamine Brilliant Rubine	C	A343
Diamine Brilliant Scarlet	C	A344
Diamine Brilliant Violet	C	A345
Diamine Bronze G	C	448
Diamine Brown (V. M.)	C	344
Diamine Brown B	C	349
Diamine Brown M	C	344
Diamine Brown V	C	329
Diamine Catechine (V.M.)	C	A346
Diamine Catechine G	S	A716
Diamine Cutch	C	432
Diamine Dark Blue B	C	A347
Diamine Dark Green N	C	A348
Diamine Fast Black (V.M.)	C	A349
Diamine Fast Blue (V. M.)	C	A351
Diamine Fast Bordeaux	C	A352
Diamine Fast Brown (V.M.)	C	A353
Diamine Fast Gray	C	A354
Diamine Fast Orange (V.M.)	C	A355
Diamine Fast Red F & (V.M.)	C	343
Diamine Fast Scarlet (V.M.)	C	A357
Diamine Fast Violet (V.M.)	C	A358
Diamine Fast Yellow (V.M.)	C	617a
Diamine Fast Yellow 3 G	C	296
Diamine Gold	C	431
Diamine Golden Yellow	C	431
Diamine Gray G	C	241
Diamine Green (V. M.)	C	474a
Diamine Green B	C	474
Diamine Green G	C	475
Diamine Heliotrope (V. M.)	C	A360
Diamine Jet Black (V. M.)	C	A361
Diamine Neron (V. M.)	C	A362
Diamine New Blue	C	A363
Diamine Nitrazol Brown G	C	A364
Diamine Nitrazol Green	C	A365
Diamine Nitrazol Orange	C	A366
Diamine Orange (V. M.)	C	A367
Diamine Pure Blue	C	426
Diamineral Blue (V. M.)	C	A371
Diamineral Brown G	C	A372
Diamine Red (V. M.)	C	363a
Diamine Red B	A	366
Diamine Red 3 B	A	367
Diamine Rose (V. M.)	C	119
Diamine Rose FFB	C	121
Diamine Scarlet (V. M.)	C	319
Diamine Scarlet HS	C	319
Diamine Sky Blue FF	C	424

Name	Manufacturer	Serial No.
Diamine Sky Blue (V.M.)	C	A368
Diamine Violet N	C	327
Diamine Violet Red B	C	A369
Diamine Yellow (V.M.)	C	A370
Diamine Yellow CP	C	304
Diamine Yellow N	C	404
Diaminogen (V.M.)	C	274
Diaminogen Blue (V.M.)	C	273
Diaminogen Blue BB, NA	C	273
Diaminogen Sky Blue N	C	A373
Diamond Black	Var	275
Diamond Black AF, CY, EA, ET	By	275
Diamond Black F	B, L, By	275
Diamond Black FB	B, By	275
Diamond Black GA	By	275
Diamond Black GAF	B	275
Diamond Black P 2 B, PV, PVT	By	157
Diamond Blue R	By	164a
Diamond Blue Black EB	By	181
Diamond Bordeaux R	By	A222
Diamond Flavine G	By	102
Diamond Green	...	276
Diamond Green B	B	495
Diamond Green B	By	276
Diamond Green BX	B	495
Diamond Green G, GF, GN	B	499
Diamond Green 3 G	By	276
Diamond Green SS	By	276
Diamond Green special	By	276
Diamond Magenta	B	U128
Diamond Magenta I	B	U129
Diamond Phosphine (V.M.)	C	609b
Diamond Red BH	By	A223
Diamond Red G	By	A224
Diamond Violet BB	AW	U577
Diamond Yellow G	By	204
Dianil Black PR	M	491
Dianil Black R	M	479
Dianil Blue B	M	380
Dianil Blue G	M	415
Dianil Blue R	M	323
Dianil Blue 2 R	M	379
Dianil Crimson B	M	A427
Dianil Garnet B	M	332
Dianil Yellow 3 G	M	25
Dianil Yellow R	M	26
Dianil Yellow 2 R	M	27
Dianisidine Blue	M	408
Dianol Black (V. M.)	Lev	436a
Dianol Black BH	Lev	436a
Dianol Black E	Lev	436a
Dianol Black EX	Lev	436a
Dianol Black RO, RW	Lev	328
Dianol Blue 402	Lev	424a
Dianol Brilliant Blue G	Lev	424b
Dianol Brown CDFB	Lev	356a
Dianol Brown LF	Lev	356a
Dianol Fast Red K	BD	279
Dianol Fast Red FG	BD	343
Dianol Green B	Lev	474
Dianol Orange 217 A	Lev	356b
Dianol Orange Brown	Lev	356c
Dianol Orange Brown X	BD	356
Dianol Red B	Lev	357
Dianol Red 2 B	Lev	356
Dianthrene Blue 2 B	I	881
Diazanil BB	M	273
Diazanil Scarlet B	M	A428
Diazanil Scarlet 6 B	M	A429
Diazine Black	K	125
Diazine Black H	Sch	333
Diazine Black 1401	K	125
Diazine Green S	K	124
Diazo Black B, OB, OT	By	308
Diazo Black R	By	308
Diazo Black 10020	BK	308
Diazo Black BHAD	S	333
Diazo Black BHN	By	333
Diazo Black BHN	WB	333
Diazo Blue X	By	A236
Diazo Blue Black RS	By	441
Diazo Bordeaux 7 B	By	A225
Diazo Brilliant Black	...	364
Diazo Brilliant Black B	By	364
Diazo Brilliant Orange GR	By	A226
Diazo Brilliant Scarlet B	By	A227
Diazo Brilliant Scarlet 3 B	By	A228
Diazo Brilliant Scarlet 6 B	By	A232
Diazo Brilliant Scarlet 2 BL	By	A230
Diazo Brilliant Scarlet 5 BL	By	A231
Diazo Brilliant Scarlet BG	By	A229
Diazo Brilliant Scarlet G	By	A233
Diazo Brilliant Scarlet PR	By	A234
Diazo Brilliant Scarlet PR	WD	A529
Diazo Brilliant Scarlet S 4 B	By	A235
Diazo Brown G	By	A237
Diazo Brown 3 G	By	A238
Diazo Brown 6 G	By	A239
Diazo Brown NR	By	A240
Diazo Brown 3 RB	By	A241
Diazo Fast Black	By	A242
Diazo Fast Black BHX	By	A243
Diazo Fast Black G	By	A244
Diazo Fast Black MG	By	A245
Diazo Fast Black SD	By	A246
Diazo Fast Black V	By	A247
Diazo Fast Bordeaux BL	By	A248
Diazo Fast Green GE	By	A249
Diazo Fast Red 7 BL	By	A250
Diazo Fast Violet BL	By	A251
Diazo Fast Violet 3 RL	By	A252
Diazo Fast Yellow G	By	A253
Diazo Fast Yellow 2 G	By	A254
Diazogene Black	AW	A541
Diazogene Black AB	AW	A542
Diazogene Black AD	AW	A543
Diazogene Black N	AW	A545
Diazogene Blue R	AW	A546
Diazogene Blue 2 R, 4585	K	A397
Diazogene Blue RD	AW	A547
Diazogene Garnet BB	AW	A548
Diazogene Red 8 B	AW	A549
Diazo Indigo Blue BR	By	274a
Diazo Indigo Blue 2 RL, 3 RL	By	274a
Diazomine Red L	CV	U730
Diazo Olive G	By	A255
Diazophenyl Black L	G	A613
Diazophenyl Blue BC	G	A614
Diazo Pure Blue 3 GL	By	A255a
Diazo Rubine B	By	A256
Diazo Sky Blue 3 GL	By	A258
Diazo Sky Blue B	By	A257
Diazurine B	By	406
Dichroine Brown	Q	U799
Dicyanine	M	U431
Dimethyl-indigo	M	888
Dioxine	L	3
Diphene Blue B	A	695a
Diphene Blue R	A	690
Diphenylamine Blue	DH	520
Diphenyl Black	M	922
Diphenyl Black L	G	A615
Diphenyl Black RC	G	A616
Diphenyl Blue 3 BC	G	A617

Name	Manu-facturer	Serial No.
Diphenyl Blue BEC	G	A618
Diphenyl Blue BTC	G	A620
Diphenyl Blue BBEC	G	A619
Diphenyl Blue 2 R	G	A621
Diphenyl Blue Black	G	334
Diphenyl Brown BBNC, BGN	G	348
Diphenyl Brown BN, BVCN	G	348
Diphenyl Brown 3 GN. 3 GNC	G	393
Diphenyl Brown GS	G	348
Diphenyl Brown RN	G	347
Diphenyl Brown TB	G	449
Diphenyl Catechine G	G	206
Diphenyl Chlorine Yellow FF	G	617
Diphenyl Chlorine Yellow G, 229	G	18a
Diphenyl Chrysoine G, GC	G	14
Diphenyl Chrysoine 3 GN, GOO	G	14
Diphenyl Chrysoine RR	G	205
Diphenyl Citronine G	G	12
Diphenyl Dark Green BC	G	A633
Diphenyl Deep Black GC	G	A622
Diphenyl Deep Black GN	G	A623
Diphenyl Deep Black GWC	G	A624
Diphenyl Deep Black VN	G	A625
Diphenyl Deep Black VP	G	A626
Diphenyl Fast Black	G	295
Diphenyl Fast Brown G, GNC	G	207
Diphenyl Fast Gray BC	G	A627
Diphenyl Fast Red	G	343
Diphenyl Fast Violet BC	G	A628
Diphenyl Fast Yellow extra	G	18
Diphenyl Fast Yellow G	G	18
Diphenyl Green BC	G	A629
Diphenyl Green G	G	467
Diphenyl Green 3 G	G	468
Diphenyl Green 3 GC, 3 GF	G	A629
Diphenyl Green KGW	G	467
Diphenyl Orange GG	G	13a
Diphenyl Orange RR	G	13
Diphenyl Red 8 B, SC	G	358
Diphenyl Red 184, 340	G	358
Diphenyl Scarlet 3 B	G	A634
Diphenyl Violet BVC	G	A635
Disulphine Blue 47073 DS	H	U753
Direct Black (V. M.)	H	442a
Direct Black ABC	AW	A550
Direct Black C	AW	A551
Direct Black D	K	U335
Direct Black D	Q	442a
Direct Black DB	K	U335
Direct Black E	I	A692
Direct Black FBS	By	A259
Direct Black FBS	CG	333a
Direct Black G	K	U335
Direct Black 3 G	S	142a
Direct Black 3 R	K	U335
Direct Black RC	By	A260
Direct Black RO	S	442a
Direct Black T	K	U335
Direct Black V	P	442
Direct Black VT	By	A261
Direct Black WC. 3899, 3919	K	U335
Direct Black 7565	CV	442a
Direct Black 8535	K	U335
Direct Black 14714	I	A693
Direct Black 33336	S	442a
Direct Blue	H	428a
Direct Blue (V. M.)	K	U336
Direct Blue A	K	U336
Direct Blue AB	Q	428a
Direct Blue B	I	428
Direct Blue 3 B	I	428a
Direct Blue 5 B	BK	379b
Direct Blue 5 B	Q	428a
Direct Blue 7 B, 12 B, BK, FF	K	U336
Direct Blue BX	I	428a
Direct Blue C, G	AW	428a
Direct Blue 3 G	S	428a
Direct Blue GN	CG	428a
Direct Blue GRC, N 2 B, R, 5 R	K	U336
Direct Blue R	I	397
Direct Blue RW	I	428a
Direct Blue WBB	WB	337
Direct Blue X 2 B	K	U336
Direct Blue 30	I	428a
Direct Blue 7079	CV	428a
Direct Blue 13108, 13503	I	428a
Direct Blue 51096	H	428a
Direct Blue Black B	By	455
Direct Blue Black 313	Lev	455b
Direct Brilliant Blue 8 B	I	428b
Direct Brown	L	A502
Direct Brown (V. M.)	K	U337
Direct Brown B, H	K	U337
Direct Brown G	L	A503
Direct Brown 2 G	...	457
Direct Brown 3 GNC	G	A636
Direct Brown HB	L	A504
Direct Brown J, JJB, JP	I	486
Direct Brown M	I	344
Direct Brown N	L	A505
Direct Brown RW	Q	344a
Direct Brown TB	K	U337
Direct Catechine G	S	A717
Direct Catechine 30	S	A718
Direct Chrome Black 14722	I	A694
Direct Chrome Brown	AW	A552
Direct Cotton Blue GS, RDB	K	U338
Direct Cotton Gray	K	U340
Direct Cotton Green 2 B	K	U339
Direct Cutch GG	I	A695
Direct Dark Brown M	L	344
Direct Dark Green	K	U341
Direct Dark Green S	I	478b
Direct Dark Violet BE	K	U342
Direct Deep Black E	A	A20
Direct Deep Black E	By	462a
Direct Deep Black EW	By	462
Direct Deep Black NTS	K	U343
Direct Deep Black RW	By	463
Direct Fast Black B	I	A696
Direct Fast Blue	AW	A553
Direct Fast Blue FFB	K	U344
Direct Fast Brown C, GB	K	U345
Direct Fast Brown GG	By	A262
Direct Fast Gray RN	K	U346
Direct Fast Orange 16710	I	392c
Direct Fast Red F	I	343
Direct Fast Red 17727, 25420	I	343a
Direct Fast Scarlet (V. M.)	I	A698
Direct Fast Scarlet 4 BS	S	U704
Direct Fast Scarlet 4 BS, 8 BS	K	U347
Direct Fast Scarlet SE	I	279
Direct Fast Violet 3654	K	U348
Direct Fast Yellow	tM	617c
Direct Fast Yellow OO, R	GrE	617c
Direct Gray B	I	398
Direct Gray B, J	P	681
Direct Gray R	I	354

Name	Manufacturer	Serial No.
Direct Green	I	478a
Direct Green B	CG	A444
Direct Green B	I, S	478a
Direct Green C	CG	A445
Direct Green G	CG	A446
Direct Green G	S	475
Direct Green 3 GG, Y	I	478a
Direct Green KGD	CG	A447
Direct Green U	Q	478a
Direct Green 10865	CG	A448
Direct Green 9753, 34267	S	478a
Direct Indigo Blue A	I	439
Direct Indigo Blue BK	I	440
Direct Indigo Blue BN	I	353
Direct Indone Blue R	S	443
Direct Navy Blue	K	U349
Direct Navy Blue B	K	U349
Direct Orange BR, G	S	392b
Direct Orange G	I	392
Direct Orange H	G	11b
Direct Orange R	I	362
Direct Orange R	K	11a
Direct Orange 6 R	L	A506
Direct Orange 1901	BK	392b
Direct Orange 6693	I	392b
Direct Pure Blue	CG	U491
Direct Purple N	K	U350
Direct Red	I, S	307b
Direct Red B	DH	307b
Direct Red 3 B	S	307b
Direct Red N	K	U351
Direct Red 215, 1725	I	307b
Direct Safranine B	I	A699
Direct Scarlet AB	Q	U800
Direct Scarlet B	S	U705
Direct Scarlet 3 B	S	U706
Direct Scarlet FB	BK	U480
Direct Sky Blue	I	A700
Direct Sky Blue B	WB	426
Direct Sky Blue FF	S	A719
Direct Sky Blue 22	S	A720
Direct Sky Blue 13108	I	A700
Direct Sky Blue, greenish	...	424
Direct Violet B	H	413a
Direct Violet BB	I	413
Direct Violet R	CG	A449
Direct Violet R	Q	352
Direct Violet R	I	352
Direct Violet RR	S	413a
Direct Violet 3653, 4561	K	A398
Direct Violet 11508	CG	A450
Direct Violet, 12932, 18510	I	413a
Direct Yellow (V. M.)	K	9b
Direct Yellow B	A	9g
Direct Yellow BK	K	9b
Direct Yellow C	S	9e
Direct Yellow CA	H	9h
Direct Yellow CR	I	304b
Direct Yellow EGOO	GrE	A459
Direct Yellow F	Sch	9
Direct Yellow G, GBE, GR	K	9b
Direct Yellow G	L	304b
Direct Yellow 2 G	K	9b
Direct Yellow 6 G	S	9f
Direct Yellow GOO	GrE	A460
Direct Yellow MC	G	9d
Direct Yellow PC	Q	9h
Direct Yellow PI	K	9b
Direct Yellow R	By, GrE	9
Direct Yellow R	GrE	A461
Direct Yellow 2 RF	Sch	9
Direct Yellow TO	I	617b
Direct Yellow V	AW	9c
Direct Yellow WH	WB	342
Direct Yellow Z	Q	9h
Direct Yellow 242	ClCo	9
Direct Yellow 19305	I	304b
Domingo Alizarin Black EF	L	A507
Domingo Alizarin Black G	L	A508
Domingo Alizarin Blue R	L	A509
Domingo Alizarin Bordeaux	L	A509a
Domingo Black 46216	L	A510
Domingo Blue Black B	L	216
Domingo Violet A	L	61
Double Brilliant Scarlet G	tM, etc.	174
Double Ponceau R	By	108
Double Ponceau 2 R	By	A263
Double Ponceau 4 R	By	A264
Double Scarlet	K	247
Double Scarlet extra S	A, Lev	176
Drazaline Alizarin	AW	A554
Drazaline Black BH	AW	A555
Drazaline Blue 10 B	AW	A556
Drazaline Blue 2 BFL	AW	A557
Drazaline Blue CV	AW	A558
Drazaline Blue F	AW	A559
Drazaline Blue FF	K	U352
Drazaline Blue FS	AW	A560
Drazaline Blue RFL	AW	A562
Drazaline Blue VVV	AW	A563
Drazaline Blue Black HWF	AW	A561
Drazaline Bordeaux 6 B	AW	A564
Drazaline Brilliant Yellow	AW	A565
Drazaline Brown C 3 B	AW	A566
Drazaline Brown FL	AW	A567
Drazaline Brown G	AW	A568
Drazaline Brown 3 GL	AW	A569
Drazaline Brown 4 J	AW	A570
Drazaline Brown R	AW	A571
Drazaline Chlorine Yellow G	AW	A572
Drazaline Diamond Violet BB	AW	A573
Drazaline Fast Blue 4 GFL	AW	A574
Drazaline Fast Gray	AW	A575
Drazaline Fast Red	AW	A576
Drazaline Fast Red F	AW	A577
Drazaline Fast Yellow B	AW	A578
Drazaline Garnet BB	AW	A579
Drazaline Garnet FL	AW	A580
Drazaline Green BX	AW	A581
Drazaline Indigo Blue	AW	A582
Drazaline New Red	AW	A583
Drazaline New Red 10 B	AW	A584
Drazaline Orange FL	AW	A585
Drazaline Orange G	AW	A586
Drazaline Orange R	AW	A587
Drazaline Red F	AW	A589
Drazaline Red FL	AW	A590
Drazaline Red FV	AW	A591
Drazaline Scarlet B	AW	A592
Drazaline Sky Blue FF	AW	A593
Drazaline Violet D	AW	A594
Drazaline Violet NFL	AW	A595
Drazaline Violet VB	AW	A596
Drazaline Yellow R	AW	A597
Drazaline Yellow R	M	U433
Drazaline Yellow S	AW	A599
Drazaline Yellow T	AW	A598
Duranthrene Blue CC	...	842
Duranthrene Blue RS	...	838
Duranthrene Yellow	...	849
Durindone Blue 4 B	BD	881
Durindone Blue 5 B	BD	882
Durindone Blue 6 B	BD	883
Durindone Red B	BD	912
Durindone Red N	BD	917

Name	Manu-facturer	Serial No.
Durindone Scarlet R	BD	905
Dutch Yellow	FA	103
Eboli Blue B	L	389
Eboli Green	L	466
Eclipse Black C	G	720G
Eclipse Brown B	G	S141
Eclipse Brown GC	G	S142
Eclipse Brown R	G	S143
Eclipse Fast Brown BC	G	S144
Eclipse Fast Brown GC	G	S145
Eclipse Fast Brown 3 GC	G	S146
Eclipse Fast Brown 4 R	G	S147
Eclipse Fast Dark Brown BC	G	S148
Eclipse Fast Red Brown	G	S149
Eclipse Fast Red Brown E	G	S150
Eclipse Phosphine GGC	G	S151
Eclipse Phosphine RRC	G	S152
Eclipse Yellow G	G	S153
Eclipse Yellow 3 G	G	S154
Emine Red	A	123
Eosamine B, G	A	100
Eosine	Var	587
Eosine (V. M.)	Var	587
Eosine A	B, By	587a
Eosine AG	B	587a
Eosine AG, A 3 G, BB	M	587
Eosine BN, BNL	B	590
Eosine CA, W	B	587a
Eosine S, SP	B	589
Eosine Spirit Soluble	tM	588
Eosine (yellowish) 701	G	587
Era Black J	Lev	275
Ergane Yellow G	B	U130
Ergane Yellow R	B	U131
Ergane Yellow W	B	U132
Erganone Blue B	B	U133
Erganone Blue G	B	U134
Erganone Gray B	B	U135
Erganone Violet R	B	U136
Erica B	A, etc.	121
Erica BB	S	121
Erica BN	A	121
Erica G	A, Lev	122
Erica G	S	122a
Erica GN	A	122
Erica 2 GN	A	117
Erie Direct Black G, GX	Sch	462
Erie Direct Black R	Sch	463
Erie Direct Black RX	Sch	463
Erie Direct Brown GB	Sch	477a
Erie Direct Brown GR	Sch	477
Erie Direct Brown 3 RB	Sch	344
Erie Direct Brown RF, 2 RF	Sch	488
Erie Direct Green ET	Sch	464
Erie Direct Green MT	Sch	474
Erie Direct Green WT	Sch	464
Erie Orange 2 R	Sch	311
Erioazurine BC	G	A638
Eriocarmine 2 BC	G	A639
Eriochromal Brown EB	G	U612
Eriochromal Gray 5 G	G	U613
Eriochrome Azurol B, BC	G	551
Eriochrome Azural S	G	554
Eriochrome Black A	G	184
Eriochrome Black T	G	183
Eriochrome Blue Black B, BC	G	180
Eriochrome Blue Black G	G	180a
Eriochrome Blue Black R	G	181
Eriochrome Brown RC	G	A640
Eriochrome Brown SDE	G	A641
Eriochrome Brown V	G	A642
Eriochrome Cyanine R, RC	G	553
Eriochrome Geranol R	G	U614
Eriochrome Green H	G	U615
Eriochrome Green L	G	U616
Eriochrome Green M	G	U617
Eriochrome Green O	G	U618
Eriochrome Olive G	G	U619
Eriochrome Phosphine R	G	133
Eriochrome Red AW, B	G	29
Eriochrome Verdon A, S	G	260
Eriochrome Violet B	G	A643
Eriochrome Violet 2 BL	G	A644
Eriochrome Yellow 2 G	G	A645
Eriochrome Yellow 3 G	G	A646
Eriochrome Yellow GR	G	A647
Eriochrome Yellow S	G	A648
Eriocyanine A, AC, R	G	531
Erio Fast Blue SWR	G	A637
Erioflavine SX	G	19
Eriofloxine 6 B	G	66
Eriofloxine 2 G	G	42
Erioglaucine	G	506
Erioglaucine A, AP, EP, X	G	506
Erioglaucine 49141	H	506
Erio Green B	G	564
Erio Green N	G	564
Erio Green Supra	G	564
Eriorubine B	G	A649
Erio Violet BC	G	U610
Erio Violet RLC	G	U611
Erioviridine B	G	503
Erweco Alizarin Acid Blue R	RWCo	857
Erweco Alizarin Acid Red BS	RWCo	781
Erythrine 7 B	B	255
Erythrine C	C	A374
Erythrine P	B	228
Erythrine RR	B	249
Erythrosine	M	592
Erythrosine A	M	592
Erythrosine B	M, etc.	592
Erythrosine G	B, L	591
Ethyl Acid Blue RR	B	63
Ethyl Acid Violet S 4 BXX	B	61
Ethyl Blue B	B	A 76
Ethyl Purple	B, etc.	518
Ethyl Violet	B, G	518
Ethyl Violet	M, I	518
Ethyl Violet 8682	I	518
Euchrysine (V.M.)	B	608
Euchrysine RR, GG, GNX, GRNT	B	608
Euchrysine NX, RT, RRD	B	608
Euchrysine 3R, 3 RX	B	603
Excelsior Black	AW	A600
Excelsior Lake Scarlet (V.M.)	C	A375
Excelsior Scarlet G	M	U434
Excelsior Scarlet 3 R	M	U435
Export Blue 1504	B	U137
Fast Acid Blue	...	562
Fast Acid Blue B	By	562
Fast Acid Blue 3 B	Q	562d
Fast Acid Blue R	M	584
Fast Acid Blue RH	H	584a
Fast Acid Eosine G	M	581
Fast Acid Fuchsine B	By	41
Fast Acid Green RH	H	503a
Fast Acid Magenta G	M	581a
Fast Acid Marine Blue HBBX	B	U138
Fast Acid Navy Blue GRI	I	U665
Fast Acid Phloxine A	M	581
Fast Acid Red A	M	581b
Fast Acid Red EB, EGG	L	67a
Fast Acid Red RH	H	67a
Fast Acid Violet	AW, C	580a

Name	Manufacturer	Serial No.
Fast Acid Violet	...	582
Fast Acid Violet A 2 R	M	582
Fast Acid Violet B	By	562
Fast Acid Violet B	M	580
Fast Acid Violet 3 B	K	U353
Fast Acid Violet 10 B	By	528
Fast Acid Violet ERR	B	U139
Fast Acid Violet R	K	U353
Fast Acid Violet R, RBE	M	580a
Fast Acid Violet RGE	M	582
Fast Acid Violet RX	H	580a
Fast Acid Violet 416	K	U353
Fast Acid Yellow (V.M.)	C	23a
Fast Acid Yellow RBE	M	U436
Fast Acid Yellow RH	H	137a
Fast Black	G	U622
Fast Black	L	658
Fast Black B	B	740
Fast Black BS	B	741
Fast Black N	B	160
Fast Blue	tM	699
Fast Blue AOOOO	GrE	699b
Fast Blue B	A	697
Fast Blue B	AW	699
Fast Blue BB	G	U623
Fast Blue 3 BB	GrE	699b
Fast Blue O	M	699
Fast Blue R	B, K	699
Fast Blue RD	A	649
Fast Blue Z	G	U624
Fast Blue 62105	A	649
Fast Bordeaux B	BK	236a
Fast Bordeaux G	BK	236a
Fast Brilliant Acid Carmine 6B	GrE	66c
Fast Brilliant Black 12349	I	U666
Fast Brown	A	172
Fast Brown	By	213
Fast Brown 3 B	A	172
Fast Brown G	A	212
Fast Brown GS	G	U625
Fast Brown N	B	160
Fast Brown O	M	214
Fast Chrome Black	AW	U578
Fast Chrome Black	H	275a
Fast Chrome Black K	BK	U481
Fast Chrome Blue FR	Q	U801
Fast Cotton Blue 6 GO	L	U518
Fast Cotton Yellow	WD	U544
Fast Direct Yellow 22090	S	304b
Fast Eosine L	B	590b
Fast Garnet 5 B	AW	U579
Fast Gray B	GrE	681
Fast Gray RGB	CG	681
Fast Green B	tM	U529
Fast Green CR	By	523
Fast Green bluish	By	523
Fastilene Blue F	AW	U582
Fastilene Green GG	AW	U583
Fastilene Violet B	AW	U584
Fastilene Violet R	AW	U585
Fastilene Yellow	AW	U586
Fast Leather Yellow 26855	By	U239
Fast Light Green	By	523a
Fast Light Orange G	By	38
Fast Light Yellow G, 2 G, 3 G, GGN	By	19
Fast Light Yellow 3 G	B	U140
Fast Light Yellow RG	By	19a
Fast Mordant Black FH	M	275
Fast Mordant Blue B	Lev	U737
Fast Mordant Blue B	M	A430
Fast Mordant Blue R	M	A431
Fast Mordant Yellow	Var	294
Fast Mordant Yellow G	B	294
Fast Navy Blue	K	649
Fast Navy Blue A	GrE	649
Fast Navy Blue BNNOO, RZOO	GrF	649
Fast Neutral Violet B	C	678
Fast Orange LG	I	35
Fast Orange O	M	148
Fast Paper Yellow G	CG	U492
Fast Parme	AW	U580
Fast Pink BN, GN	I	694
Fast Pink for silk	DH	694
Fast Ponceau L	By	A265
Fast Printing Green	K	2
Fast Printing Yellow R	By	U240
Fast Red A	Var	161
Fast Red A	B	A77
Fast Red	Var	168
Fast Red	Var	161
Fast Red A	WB	166
Fast Red ANSX	B	A78
Fast Red AV	B, By	161
Fast Red B	B, etc.	112
Fast Red BN	B	112
Fast Red BT	By,etc.	111
Fast Red CJ	B	163
Fast Red E	Var	166
Fast Red IBS	B	A79
Fast Red NS	By	168
Fast Red O	M	161
Fast Red S	Sch	161
Fast Red VR	By	164
Fast Russian Green	WD	U545
Fast Sailor Blue A, R	AW	649
Fast Scarlet B	B	U141
Fast Scarlet B	K	248
Fast Scarlet BX	B	U142
Fast Scarlet BXG	B	U143
Fast Straw Yellow V	AW	A601
Fast Sulfon Black	...	264
Fast Sulfon Black F	S	264
Fast Sulfon Violet 5 BS	S	182
Fast Sulfon Violet 4 R	S	182
Fast Toluylene Red	GrE	358a
Fast Victoria Violet S 4 B	GrE	61d
Fast Violet R	AW	A602
Fast Wool Blue I	AW	U581
Fast Wool Scarlet 4 R	BK	U482
Fast Yellow	Var	137
Fast Yellow FY	Lev	137
Fast Yellow GR	tM	137
Fast Yellow N	P	150
Fast Yellow R	K,BK	149
Fast Yellow S	C	137
Fast Yellow Y	B	149
Fast Yellow 95	Q	137
Fast Violet	...	626
Flavazine E 3 GL	M	20a
Flavazine L	M	19
Flavazine S	M	20
Flavazine T	M	20a
Flavinduline II, O.	B	668
Flavophosphine G, 4 G, R	M	609d
Flavopurpurin	...	785
Fluoresceine	Var	585
Formyl Violet (V.M.)	C	530
Fraise	P	U595
French Blue	Q	U802
French Red	P, etc.	U593
Fuchsine	Var	512
Fuchsine ASV	P	512
Fuchsine B	tM	512

Name	Manufacturer	Serial No.
Fuchsine I...	GrE	512
Fuchsine MB	tM	512
Fuchsine NB	Sch	513
Fuchsine S	B	524
Fuchsine TR	Sch	512
Fulling Orange 16700	I	250a
Fur Black DM	By	U241
Fur Gray 27953	By	U242
Furreine DB	I	923
Fuscamine	...	923
Gallamine Blue	G, By	637
Gallanilic Violet R, B	DH	639
Gallazine A	DH	645
Gallazol Blue 4 G	G	U626
Galleine	By, etc.	599
Galleine JRG paste	G	599
Galleine SR, SW, W	B	599
Gallocyanine...	Var	626
Gallocyanine D	B	626
Gallocyanine DH...	I	626
Gallocyanine F...	B	626
Gallocyanine MS	DH	628
Galloflavine W	B	772
Gallo Green DH	DH	629
Gallophenin P	By	658a
Gallo Violet D	By	U243
Gallo Violet DF	By	U244
Gallo Sky Blue B	...	641
Gambine Y	H	2
Geranine 2B, G	By	118
Geranium B	S	512
Gentiana Violet B	A	U4
Gentianine A	G	659b
Glacier Blue	I	501
Gloria Black N	By	U245
Glycine Corinth	Ki	310
Glycine Red	Ki	309
Golden Brown	A	288
Golden Orange	By	145
Gray NO	S	698a
Gray Blue 0095	K	U357
Green A	H	495a
Green BX	AW	U587
Green G	K	U354
Green HD	H	495a
Green PLX	B	4
Green VGW	B	U144
Green 21	S	U707
Green 241	Q	U803
Green 15825	H	495a
Green Crystals DIIa	K	U356
Green Crystals E	tM	495
Green Crystals F	H	495
Green Crystals M	tM	495
Green Crystals X	K	U356
Green Crystals YD	H	495
Green Crystals IIa	K	U356
Green residue	K	U355
Green residue D	K	U355
Grela Red R	GrE	U507
Guernsey Blue O	M	539
Guinea Black 3 BL	A	U5
Guinea Bordeaux B	A	U6
Guinea Bordeaux 6 B	A	U7
Guinea Bordeaux BL	A	U8
Guinea Brown R	A	U9
Guinea Brown 2 R	A	U10
Guinea Carmine B	A	A22
Guinea Carmine D	A	A23
Guinea Cyanine LB	A	U11
Guinea Cyanine LG	A	U12
Guinea Cyanine LR	A	U13
Guinea Fast Green B	A	503
Guinea Fast Green 3 B	A	U15
Guinea Fast Green 2 G	A	U16
Guinea Fast Red BL	A	U17
Guinea Fast Red 4 BL	A	U18
Guinea Fast Red 2 R	A	U19
Guinea Fast Violet AL	A	U20
Guinea Fast Violet 10 B	A	U21
Guinea Green	Var	502
Guinea Green B, G	A	502
Guinea Green 2 G	A	505
Guinea Red 4 R	A	A24
Guinea Violet	Var	530
Guinea Violet 4 B, 6 B	A	530a
Guinea Violet S 4 B	A	530
Half Wool Blue 3 R	By	U246
Half Wool Green 63816	L	U519
Half Wool Green 63816 N 5	L	U520
Hansa Green G	M	U437
Hansa Rubine G	M	U438
Hansa Rubine O	M	U439
Hansa Yellow G	M	28
Hansa Yellow 5 G	M	U441
Hansa Yellow R	M	U442
Hat Black (V.M.)	C	A376
Hat Black A, 4 AN	GrE	U508
Hat Black B	A	U22
Hat Black L, S	GrE	U508
Havana Brown S	C	U287
Helianthine	B	138
Helianthine G, GG, GFF, R	G	141
Heligoland Black BH	G	436
Heligoland Black FFNX	G	436
Heligoland Blue 6 B	G	424
Heligoland Blue RW	G	A453
Helindone Black RRG	M	921
Helindone Blue BB	M	880
Helindone Blue 3 GN	M	896
Helindone Blue 3 R	M	896a
Helindone Brown	M	904a
Helindone Brown AN	M	873
Helindone Brown CR	M	904a
Helindone Brown G	M	904
Helindone Brown 3 GN	M	836
Helindone Brown 2 R	M	902
Helindone Brown 5 R	M	903
Helindone Fast Scarlet C	M	907
Helindone Fast Scarlet R, RC	M	915
Helindone Gray 2 B, BR	M	921
Helindone Green G	M	892
Helindone Printing Black 2 RG	M	921a
Helindone Orange D	M	914
Helindone Orange GRN	M	835
Helindone Orange R	M	913
Helindone Pink	M	910
Helindone Pink AN, BN	M	910
Helindone Red B	M	917
Helindone Red 3 B	M	918
Helindone Scarlet S	M	916
Helindone Violet	M	920
Helindone Violet B, BB	M	920
Helindone Violet D	M	898
Helindone Violet R	M	920
Helindone Yellow CG	M	810a
Helindone Yellow GG vat	M	810
Helindone Yellow 3 GN	M	810
Helindone Yellow RN	M	810a
Helio Bordeaux BL	By	A266
Helio Fast Blue BL	By	858
Helio Fast Red	By	73
Helio Fast Red RL, TRL	By	73
Helio Fast Ruberine RL	By	A268
Helio Fast Violet AL	By	A269

Name	Manufacturer	Serial No.
Helio Fast Yellow 8 GL	By	A270
Helio Red RM	By	A271
Helio Red RMT	By	A272
Heliotrope 2 B	A,L,By	321
Hessian Brilliant Purple	L	302
Hessian Brown BBN	L	489
Hessian Fast Red F	L	343
Hessian Purple N	By, L	301
Hessian Yellow	L	305
Hoffmans Violet	P	514
Homophosphine G	L	609
Homophosphine OO	L	609
Hydranthrene Brilliant Copper D	...	813
Hydranthrene Dark Blue	...	763
Hydranthrene Olive R	...	791
Hydranthrene Yellow AG, AR	...	849
Hydrazine Yellow OO	GrE	A462
Hydrazine Yellow SO	GrE	A463
Hydrazol Black	AW	A603
Hydrazol Black R	AW	A604
Hydrazol Chrome Black CB	AW	A605
Hydrazol Chrome Black DB	AW	A606
Hydron Blue (V. M.)	C	748
Hydron Blue G, R	...	748
Hydron Brown (V. M.)	C	748a
Hydron Olive G	C	748b
Hydron Violet	C	748c
Hydron Yellow G	C	748d
Hylidine Ponceau 2 R	G	U627
Hylidine Ponceau 2 R	tM	U532
Immedial Black (V. M.)	C	724
Immedial Blue (V. M.)	C	724a
Immedial Bordeaux G	C	739
Immedial Brilliant Black B.	C	720
Immedial Brilliant Carbon F, FG	C	720
Immedial Brilliant Green G.	C	869
Immedial Brown (V. M.)	C	725
Immedial Carbon (V. M.)	C	720
Immedial Cutch	C	870
Immedial Cutch (V. M.)	C	871
Immedial Dark Brown (V. M.)	C	725
Immedial Dark Green B	C	873
Immedial Deep Green G	C	874
Immedial Direct Blue(V.M.)	C	875
Immedial Green (V. M.)	C	746
Immedial Green Blue	C	746
Immedial Indogene (V.M.)	C	876
Immedial Indone (V. M.)	C	733
Immedial Indone Violet B	C	733a
Immedial Khaki	C	877
Immedial Maroon B	C	739
Immedial New Blue G	C	878
Immedial Olive (V. M.)	C	879
Immedial Orange C, N	C	711
Immedial Purple C	C	880
Immedial Sky Blue	C	728
Immedial Violet C	C	881
Immedial Yellow (V. M.)	C	710
Immedial Yellow Olive (V. M.)	C	882
Imperial Green GI	By	A273
Imperial Scarlet 3 B	By	247
Imperial Yellow R	By	7b
Indalizarin I, J, R	DH	633
Indalizarin Green	DH	634
Indamine 3 R	CG	704
Indamine 6 R	CG	705
Indamine Blue	M	696
Indanthrene	B	837
Indanthrene NN	B	873a
Indanthrene Black	B	768a
Indanthrene Black B, BB	B	768a
Indanthrene Blue 3 G	B	840
Indanthrene Blue GC	B	843
Indanthrene Blue GCD	B	842
Indanthrene Blue GGS, GGSL	B	841
Indanthrene Blue GG, SP	B	841
Indanthrene Blue 3 GP	B	840
Indanthrene Blue R	B	837
Indanthrene Blue RS	B	838
Indanthrene Blue WB	B	850
Indanthrene Blue WR	B	850a
Indanthrene Blue Green B	B	765a
Indanthrene Bordeaux B	B	828
Indanthrene Bordeaux B extra	B	827
Indanthrene Brown	B	867
Indanthrene Brown B	B	867
Indanthrene Claret B	B	828
Indanthrene Claret B extra.	B	827
Indanthrene Copper R	B	813
Indanthrene Dark Blue BD	B	763
Indanthrene Dark Blue BO	B	763
Indanthrene Dark Blue BT	B	846
Indanthrene Fast Blue RR.	B	837a
Indanthrene Gold Orange G	B	760
Indanthrene Gold Orange R	B	761
Indanthrene Gold Orange RS	B	761
Indanthrene Gold Orange 2 RT	B	761
Indanthrene Gray B, BP	B	848
Indanthrene Green B	B	765
Indanthrene Maroon R	B	845
Indanthrene Olive G	B	791
Indanthrene Orange RT	B	812
Indanthrene Pink B	B	873b
Indanthrene Red BN	B	831
Indanthrene Red G	B	826
Indanthrene Red R	B	830
Indanthrene Red Brown R.	B	873c
Indanthrene Red Violet RRN	B	873d
Indanthrene Scarlet G, GS.	B	762
Indanthrene Violet B	B	768
Indanthrene Violet R	B	766
Indanthrene Violet RN	B	832
Indanthrene Violet RR	B	767
Indanthrene Violet RT	B	764
Indanthrene Violet Yellow G, P	B	849a
Indanthrene Yellow G, GP.	B	849
Indazine M	C	689
Indazurine B	I	414
Indazurine BB	I	429
Indazurine GM	I	427
Indazurine 5 GM	I	430
Indazurine RM	I	396
Indazurine TS	I	399
India Rose 17285	I	U667
Indian Red	G	U628
Indian Yellow (V.M.)	C	141b
Indian Yellow G, GN	By	141
Indian Yellow R	By	140
Indigene R	AW	697
Indigene Blue BB	I	A701
Indigene Blue R	I	A702
Indigo	Var	874
Indgio paste	Var	874
Indigo powder	Var	874
Indigo solution	M	874
Indigo FBP	By	874
Indigo G	B	888

Name	Manufacturer	Serial No.	Name	Manufacturer	Serial No.
Indigo 7 G	By	874	Janus Yellow	...	221
Indigo KB paste	K	881	Janus Yellow G	M	222
Indigo KG	K	883	Japan Black	B	U145
Indigo MLB	M	874	Japan Black B	B	U146
Indigo MLB 2 B	M	880	Japan Black M	B	U148
Indigo MLB 4 B	M	881	Japan Black MBG	B	U149
Indigo MLB 5 B	M	882	Japan Black MF	B	U150
Indigo MLB 6 B	M	883	Jasmine	G	U629
Indigo MLBR, MLBRR	M	879	Jasmine high conc	G	146
Indigo MLBT	M	868	Jaune Métanile Bruné	P	235
Indigo MLB Vat I	M	876	Jet Black APX	B	U151
Indigo NC	By	874	Jet Black R	By	202
Indigo RB	B	880	Jet Black RR	B	U152
Indigo T	...	888	Jute Black B	By	U152
Indigo Acid Blue A	Q	545	Jute Black I	tM	U532
Indigo Blue N	C	874	Jute Black RNT	B	U153
Indigo Blue 275	CJ	874	Jute Coal Black S	By	U154
Indigo Carmine Blue BG	A	U21	Katigene Black (V. M.)	By	720
Indigo Extract A, AN 4	B	877	Katigene Black Brown BW	By	839
Indigo Salt T	K	875	Katigene Black Brown GN	By	840
Indigo Yellow 3 G	I	889	Katigene Black Brown R	By	841
Indigo White	B	876	Katigene Blue Black 4 BPA	By	720
Indigotine	Var	877	Katigene Brilliant Black B, FG	By	720
Indigotine P	B	878	Katigene Brilliant Green 3 G	By	843
Indigotine 500	A	877	Katigene Brown 2 R	By	845
Indo Carbon	C	748	Katigene Brown V	By	846
Indochromine	...	667	Katigene Chrome Blue 5 G	By	847
Indochromine RR, T	S	667	Katigene Cutch B	By	848
Indochromine Black EXD	S	667a	Katigene Deep Black B	By	720
Indochromogen S	...	666	Katigene Direct Blue B	By	849
Indocyanine B, 2 RF	A	705a	Katigene Direct Blue RF	By	850
Indocyanine B	G	699c	Katigene Green	By	746
Indoine	WD	126	Katigene Green 2 B, 4 B, 2 G, MK	By	746
Indoine Blue	Sch	126	Katigene Indigo	By	851
Indoine Blue R	B	126	Katigene Indigo B	By	852
Indophenol	DH	619	Katigene Indigo G	By	853
Indo Violet BF	A	U24	Katigene Indigo 3 GT	By	854
Induline	Var	699	Katigene Khaki G	By	855
Induline	Var	697	Katigene Olive GN	By	856
Induline B	By	699	Katigene Olive Brown R	By	857
Induline 2 B	CJ	699	Katigene Red Brown R	By	858
Induline BA	P	697	Katigene Red Brown 3 R	By	859
Induline DB, N	tM	699	Katigene Violet B	By	860
Induline NN	B	699	Katigene Violet 3 R	By	861
Induline NBL	By	699	Katigene Yellow G	By	862
Induline RN	K	699	Katigene Yellow GG	By	863
Induline S	I	697	Katigene Yellow GR	By	864
Induline WLX	B	699	Katigene Yellow Brown GG	By	865
Induline 1768, 1778	K	699	Katigene Yellow Brown GR	By	866
Induline 10350	I	697	Katigene Yellow Brown 9 R	By	867
Induline 38724, 38725	H	699	Katigene Yellow Brown RL	By	868
Induline Black base 5789	K	700	Ketone Blue 4 BN	M	547
Induline Red (V. M.)	K	699a	Ketone Fast Violet 10 B	I	528
Induline Scarlet (Iris Blue)	B	671	Kiton Blue N	I	U668
Induline Spirit Soluble	Var	697	Kiton Blue V	I	543
Induline Water Soluble	Var	699	Kiton Fast Green V	I	564
Ingrain Black	H	A759	Kiton Fast Orange G	I	U669
Ingrain Black 4 B	H	A758	Kiton Red 6 B	I	U672
Ink Blue BJTBNOO	GrE	U509	Kiton Red G	I	U673
Ink Blue BJTNO	GrE	U509	Kiton Fast Violet 10 B	I	528
Ink Blue BNOO	GrE	U509	Kiton Violet 12 B	I	U674
Intensive Blue B	By	562	Kiton Fast Yellow 3 G	I	U670
Iris Blue	B	648	Kiton Fast Yellow R	I	U671
Irisamine	C	576	Kiton Yellow G	I	U675
Irisamine G	C	576	Kiton Yellow GG	I	U676
Irisamine G ex	S	576	Kraft Brown L	B	U155
Isamine Blue (V. M.)	C	U288	Kraft Brown basic YZ	B	U155
Isodiphenyl Black R	G	437	Kryogene Black BNX	B	755
Isopurpurin	...	784	Kryogene Black TBO, TG	B	720
Italian Green	...	709	Kryogene Black TGE, TGO	B	720
Janus Brown B	M	435	Kryogene Black TGO	B	756
Janus Gray B	M	128			
Janus Red B	M	240			

Name	Manufacturer	Serial No.
Kryogene Blue BNO	B	753
Kryogene Brown A	B	743
Kryogene Brown A, G	B	750
Kryogene Brown GX	B	750
Kryogene Brown RB, RBNXX	B	751
Kryogene Brown RXX	B	751a
Kryogene Direct Blue B	B	753
Kryogene Direct Blue 3 B	B	754
Kryogene Direct Blue BNAGX	B	753
Kryogene Direct Blue G, GO	B	752
Kryogene Green GX	B	754a
Kryogene Pure Blue R	B	729
Kryogene Red Brown GRXX	B	751b
Kryogene Violet 3 RX	B	754b
Kryogene Yellow	...	712
Kryogene Yellow G, GG	B	712
Kryogene Yellow R	B	716
Lacquer Black R	A	U25
Lake Black C	C	U289
Lake Black P	G	U630
Lake Blue ABII	M	U443
Lake Blue ABOII	M	U444
Lake Blue AV	M	U445
Lake Blue AVO	M	U446
Lake Blue I	B	U156
Lake Blue RT	BK	U483
Lake Bordeaux B	M	179
Lake Purple 3 P	B	U157
Lake Red	Var	153
Lake Red C	M	153
Lake Red D	M	200
Lake Red P	M	132
Lake Scarlet	C	A377
Lake Scarlet Red D	M	A435
Lake Yellow 28227	By	U247
Lanacyl Blue B, BB	C	187
Lanacyl Violet B, BF	C	186
Lanafuchsine (V. M.)	C	64
Leather Black (V. M.)	C	U290
Leather Black BO	B	U158
Leather Black CR	B	U159
Leather Black I	I	U677
Leather Black	K	U358
Leather Black R	tM	U535
Leather Black T	M	U447
Leather Black 3553	GrE	U511
Leather Brown	GrE	208
Leather Brown	K	U359
Leather Brown GG	By	U248
Leather Brown LX	Lev	283a
Leather Brown R	I	283a
Leather Flavine 9118	I	606g
Leather Flavine 9118	S	606g
Leather Gold 5902	BK	U484
Leather Olive 71930	A	U26
Leather Orange	Sch	211
Leather Orange B	Lev	U738
Leather Orange BY	Lev	U739
Leather Red O	M	U448
Leather Yellow A	GrE	606
Leather Yellow FG, FU	Q	606
Leather Yellow G	Var	606
Leather Yellow 2 G, 3 G	CG	606
Leather Yellow GC, GS, M	GrE	606
Leather Yellow GN	AW	606
Leather Yellow NL	BK	606
Leather Yellow O	M	606
Leather Yellow P	tM	606
Leather Yellow R, TG	Q	606
Leather Yellow TBR	tM	606
Leather Yellow 5828a	L	606
Lemon Yellow R	K	U360
Leuco-Gallo Thionine DH	DH	664
Leucol Dark Green B	By	866
Leucol Brown B	By	872
Light Blue	tM	521
Light Blue G	tM	539
Light Blue Superfine Spirit Soluble	M	520
Light Green A ex conc	tM	503
Light Green 2 A	tM	518
Light Green 2 G conc	B	505
Light Green SF	B	504
Light Green SF	B	505
Light Green SF Bluish	B	504
Light Green SF Yellowish	B	505
Light Green SF Yellowish	Q	505
Light Green SL	B	505
Light Green Yellowish	...	505
Lilac PC	DH	U599
Lilac PC	G	U631
Liquid Oil Black N	tM	U536
Lissome Green	H	566
Lithol Claret B	B	A80
Lithol Fast Orange R	B	A82
Lithol Fast Scarlet B, G, RN	B	73a
Lithol Fast Scarlet R	B	73
Lithol Red 3 B, GG, 3 G	B	173a
Lithol Red R	B	173
Lithol Red RG, RS	B	173a
Lithol Rubine B, BN, G, RG	B	152
Magenta	Var	512
Magenta A	B	512
Magenta AB	B	512
Magenta B	C	512
Magenta FABS	H	512
Magenta L, S	B	512
Magenta TP	tM	512
Magenta (acetate)	B	512
Magenta crystals	Var	512
Magenta crystals 3	tM	512
Magenta crystals II	tM	512
Malachite Green	Var	495
Malachite Green (V. M.)	Var	495
Malachite Green Base	Var	495
Marine Blue B	I	537
Marine Blue RR	tM	U537
Maroon	By	512
Marron Cordu	Q	512
Mars Red AX, GX	B	163
Martius Yellow	A, BK	6
Martius Yellow 741	G	6
Martius Yellow 6749	BK	6
Mauve	P, etc.	688
Melanogene Blue	M	745
Melantherine BH	I	333
Melantherine IH	I	333c
Melantherine RO	I	328
Melantherine 11818, 12760	I	333c
Melantherine Black BH	I	333
Meldola's Blue	...	649
Meldola's Blue 3 R	S	649
Melogene Blue BH	S	438
Mercerine Wool Scarlet 5 B	H	U756
Mercerol Brown 3 R	H	U754
Mercerol Orange 2 R	H	U755
Meridian Black AE	S	U708
Meridian Black AN	S	U709
Metachrome Blue B	A	U27
Metachrome Blue G	A	U28
Metachrome Blue Black 2 B	A	U29
Metachrome Blue Black 2 BX	A	U30
Metachrome Bordeaux R	A	92
Metachrome Brown B	A	89

Name	Manufacturer	Serial No.
Metachrome Brown BL	A	U31
Metachrome Brown BRL	A	U32
Metachrome Olive B	A	A25
Metachrome Olive Brown G	A	A26
Metachrome Orange R	A	58
Metachrome Orange 3 R	A	U33
Metachrome Red G	A	U34
Metachrome Violet B	A	U35
Metachrome Violet 2 R	A	U36
Metachrome Yellow RA	A	A27
Metamine Brown	S	U710
Metanil Yellow	Var	134
Metanil Yellow (V. M.)	Var	134
Metanil Yellow Brominated	P	135
Metanil Red 3 B	By	A274
Meta-Nitraniline Orange	M	46
Meta-phenylene Blue B, 2 B	C	691
Meta-phenylene Blue R	C	690
Methyl Alkali Blue	B, etc.	535
Methyl Alkali Blue Pure	I	535
Methyl Blue	tM	537
Methyl Blue	A, C	538
Methyl Blue MBS	GrE	537
Methyl Blue for silk	GrE,M	537
Methyl Eosine	B	588
Methyl Gallus Blue	G	U632
Methyl Green	P, etc.	519
Methyl Indone B	C	127
Methyl Lyons Blue	G	537
Methyl Orange	tM, etc.	138
Methyl Silk Blue (new)	G	537
Methyl Soluble Blue 3 S	B, etc.	U160
Methyl Violet	Var	515
Methyl Violet B	Var	515
Methyl Violet BB	Var	515
Methyl Violet 3 B	tM	515
Methyl Violet 4 B	M,tM	515
Methyl Violet 5 B	By, etc.	517
Methyl Violet 5 B	tM	515
Methyl Violet 6 B	B	517
Methyl Violet 6 B	M	515
Methyl Violet 7 B	By,tM	517
Methyl Violet base 7 B	BK	517
Methyl Violet B-BBM	M	515
Methyl Violet 3 BHN	tM	515
Methyl Violet BIA, 2 BIA	tM	515
Methyl Violet 2 BP,3 BIA, 5 BIA	tM	515
Methyl Violet 2 BN, 6 BN	tM	515
Methyl Violet 4 BOOATN	GrE	515
Methyl Violet DB	tM	515
Methyl Violet IB, IBA	By	515
Methyl Violet N, NY 147	B	515
Methyl Violet R, 3 R	M, tM	515
Methyl Violet 5 R	Var	515
Methyl Violet 5 RA	tM	515
Methyl Violet RIA	tM	515
Methyl Violet 5 RO	B	515
Methyl Violet 129	K	515
Methyl Violet base	B	515
Methyl Violet base BB	K	515
Methyl Violet base 74418	H	515
Methylene Blue	Var	659
Methylene Blue AN, BB	B	663
Methylene Blue B	Var	659
Methylene Blue 2 B	Var	659
Methylene Blue BA	tM	659
Methylene Blue BEX	B	659
Methylene Blue 2 BD	A	659
Methylene Blue BG	B	659
Methylene Blue BG	tM	659
Methylene Blue BGN	B	659
Methylene Blue BX	A	659
Methylene Blue D	I	659
Methylene Blue DBBM, DDBM	M	659
Methylene Blue FKII	K	659
Methylene Blue G	I	659
Methylene Blue HGG	B	659
Methylene Blue L	K	659
Methylene Blue MD	B	659
Methylene Blue MDX	B	659
Methylene Blue MEDZ	M	659
Methylene Blue MNX	B	663
Methylene Blue 3 R	M	659
Methylene Blue S	CR	659
Methylene Blue VN	B	663
Methylene Blue 15746	P	659
Methylene Blue 52067	tM	659
Methylene Gray ND, O	M	681
Methylene Green	K, S	660
Methylene Green B, BX	B	660
Methylene Green BX	K	660
Methylene Green G	S	660
Methylene Green N, O	M	660
Methylene Green P	G, I	660
Methylene Green T, W	G	660
Methylene Green 247	K	660
Methylene Heliotrope O	M	687
Methylene SZO	DH	659
Methylene Violet	Var	680
Methylene Violet B	DH	680
Methylene Violet BN	M	680
Methylene Violet 2 R	H	680
Methylene Violet 3 RA	K	680
Methylene Yellow H	M	618
Mikado Brown 2 B, M	L	11
Mikado Golden Yellow 6 G, 8 G	L	10
Mikado Orange (V. M.)	L, etc.	11
Mikado Orange 4 RC	A	11
Mikado Orange 4 RO	A, L	11
Mikado Yellow	...	10
Milling Blue	K	693
Milling Blue BC	K	693
Milling Blue GR	A	U 37
Milling Blue 2 R	M	A436
Milling Blue 5 R	A	U38
Milling Brown G	L	U521
Milling Brown BW	L	503
Milling Green DB, DS	AW	523b
Milling Orange	WD	250
Milling Orange G	A	U39
Milling Orange G	By	A275
Milling Orange JN	WD	250
Milling Orange RO	L	58
Milling Orange 88	WD	250
Milling Red	A	U40
Milling Red G	C	293
Milling Red 4 BA	A	493
Milling Red 6 BA	A	U41
Milling Red GA	A	U42
Milling Red R	WD	298
Milling Scarlet B, G	M	400b
Milling Scarlet BS	ClCo	484
Milling Scarlet 4 R	M	400
Milling Yellow (V. M.)	C	A378
Milling Yellow 3 G	A	U43
Milling Yellow GA	A	U44
Milling Yellow 3 GO	CV	177
Milling Yellow H, HG, H 3G	M	177c
Mimosa	G	198
Mimosa C, R, Z, 2	G	198
Mineral Blue	C	U291
Modern Azurine DH	DH	640
Modern Blue	DH	629

Name	Manufacturer	Serial No.
Modern Cyanine	DH	627
Modern Violet	DH	635
Modern Violet N	DH	624
Monochrome Black F	By	U249
Monochrome Black Blue G.	By	U250
Monochrome Blue 5 R	By	U251
Monochrome Brown BX	By	U252
Monochrome Brown G	By	U253
Monochrome Brown V	By	U254
Mordant Blue 13707	I	A703
Mordant Yellow GD, GS, R	B	177
Mordant Yellow GTS	B	48
Mordant Yellow O	M	177
Mordant Yellow 3 R	B	58
Muscarine	DH	655
Nako Blue Black B	M	923a
Nako Black DBB, O	M	923a
Nako Brown B, DR, 3 GA	M	923a
Nako Brown 3 GN, P, RH.	M	923a
Nako Gray B, 6 B	M	923a
Nako Yellow O	M	923a
Nankin	tM	606g
Naphthalene Acid Black 4 B	By	258
Naphthalene Black D	H	U758
Naphthalene Black 12 B	H	217
Naphthalene Blue B	M	A437
Naphthalene Blue DL	M	A438
Naphthalene Green	M	564
Naphthalene Green V	M, I	564
Naphthamine Black RE	K	335
Naphthamine Blue (V. M.).	K	338
Naphthamine Blue 2 B, 3 B	K	338
Naphthamine Brilliant Blue G	K	379a
Naphthamine Brilliant Blue 3	K	379a
Naphthamine Brown	K	477a
Naphthamine Brown 4 G	K	477
Naphthamine Deep Black HW	K	335a
Naphthamine Direct Black (V. M.)	K	458
Naphthamine Direct Blue BXR	K	A399
Naphthamine Direct Blue ER	K	A399
Naphthamine Direct Blue 2 R, 3 R	K	A399
Naphthamine Direct Blue 3692	K	A399
Naphthamine Direct Green AG	K	A400
Naphthamine Fast Black (V. M.)	K	U362
Naphthamine Fast Black KS	K	U361
Naphthamine Fast Bordeaux BG	K	U363
Naphthamine Fast Scarlet (V. M.)	K	U364
Naphthamine Green (V.M.)	K	A401
Naphthamine Orange (V.M.)	K	A402
Naphthamine Red 3605 H	K	343
Naphthamine Scarlet	K	U365
Naphthamine Violet BE.	K	326
Naphthamine Violet R	K	327b
Naphthamine Yellow (V.M.)	K	9a
Naphthamine Yellow R, X.	K	9a
Naphthazine Blue	WD	692
Naphthazine Navy Blue 156	WD	692a
Naphthazurine B, BA	GrE	383
Naphthazurine 3703	K	383
Naphthochrome Violet R	I	U678
Naphthoform Black 3930	K	U366
Naphthogene Blue B	A	A28
Naphthogene Blue 2 R	A	A29
Naphthogene Blue 4 R	A	A30
Naphthogene Blue 6 R	A	A31
Naphthogene Indigo Blue R	A	U45
Naphthogene Pure Blue 4 B	A	U46
Naphthol Black (V. M.)	C	272a
Naphthol Black (V. M.)	K	269a
Naphthol Black A	K	269a
Naphthol Black B	C	272
Naphthol Black 2 B	By	269d
Naphthol Black 3 B	CV	272a
Naphthol Black 6 B	C, K	269
Naphthol Black BR	tM	269
Naphthol Black CR, MB, N, TR	K	269a
Naphthol Black greenish	K	296a
Naphthol Blue	C	A379
Naphthol Blue 2 R	tM	649
Naphthol Blue Black (V.M.)	Var	217
Naphthol Blue Black M	By	217
Naphthol Blue Black 6 B.	BK	217
Naphthol Dark Green G	C	U292
Naphthol Green	tM	4
Naphthol Green B	By, C	4
Naphthol Orange	Var	144
Naphthol Pink	...	98
Naphthol Red (V.M.)	C	168
Naphthol Red GR	B	166
Naphthol Red S	B	168
Naphthol Yellow	I	7
Naphthol Yellow S	Var	7
Naphthol Yellow SE	B, By	7
Naphthol Yellow SLC, SLZ	M	7
Naphthylamine Black D	C, K	266
Naphthylamine Black (V.M.)	C, K	266
Naphthylamine Black 4 AN, 4 B	By	217d
Naphthylamine Black 10 B.	By	217
Naphthylamine Black 4 BK	By	217d
Naphthylamine Red 3 BM.	B	168a
Naphthylamine Black B 2 N	K	266a
Naphthylamine Black 6 BN	By	217d
Naphthylamine Black BOO	K	266a
Naphthylamine Black 4 BX	B	266a
Naphthylamine Black CSR, CSB	By	217d
Naphthylamine Black F	By	217d
Naphthylamine Black NA	K	266a
Naphthylamine Black NSBN	K	266a
Naphthylamine Black SX	B	266a
Naphthylamine Black 2002, 2003	K	266a
Naphthylamine Blue Black	C	A380
Naphthylamine Blue 2 B	K	338
Naphthylamine Blue 3 B	K	338
Naphthylamine Brown	B	160
Naphthylamine Green T	By	A276
Naphthylamine Sky Blue DD	NF	A530
Naphthylamine Yellow	K	6
Naphthyl Blue Black N	C	268
Naphthylene Violet	C	432
Navy Blue	C	A381
Navy Blue D	I, S	537a
Navy Blue F	AW	537
Navy Blue GR, 5 R	CV	537a
Navy Blue 17184	K	U367
Navy Blue SM	P	537a
Navy Blue T	AW	537
Neotolyl Black B	M	U450
Neotolyl Black BB	M	U451
Neotolyl Black 4 B	M	U452
Neotolyl Black TL	M	U453

Name	Manufacturer	Serial No.
[illegible] Black VL	M	U454
Neptune Blue B	B	543
Neptune Blue BG, BGN, BGX	B	543
Neptune Blue BR, BTE, R	B	543a
Neptune Blue RXX	B	545
Neptune Brown RX	B	U382
Neptune Green	B	502
Neptune Green SAX, SBL, SGX	B	505
Nerazine (V. M.)	C	U365
Nerol B	A	A32
Nerol 2 B	A	A33
Nerol BL	A	A34
Nerol 2 BL	A	A35
Nerol VL	A	A36
Neutral Blue	C	676
Neutral Blue R	AW	676
Neutral Blue 3 R	M	U455
Neutral Gray	....	221
Neutral Gray G	A	241
Neutral Red	C	670
Neutral Violet	C	669
Neutral Violet O	M	U456
New Acid Chrome Black R	AW	A607
New Chrome Black PK	CV	271a
New Blue B, G	C, etc.	650
New Blue R	Var	649
New Blue RR, BG	B	649
New Claret B	B	A83
New Claret F	B	A85
New Claret R	B	A86
New Coccine	A	169
New Direct Blue S	K	U368
New Ethyl Blue BS	M	U457
New Ethyl Blue RS	M	U458
New Fast Blue F, H	By	652
New Fast Blue R, RS	I	652a
New Fast Gray	By	681
New Fast Green 2 B	I	497
New Fast Pink F	By	652
New Fast Straw Yellow	AW	A608
New Fuchsine O	M	513
New Fuchsine S	GrE	513
New Magenta O	GrE	513
New Magenta O	M	512
New Methylene Blue (V.M.)	C	663
New Methylene Blue F	By	663
New Methylene Blue GG	C	651
New Methylene Blue NNX	B	663
New Nigrosine	AW	700
New Patent Blue B	By	563
New Patent Blue GA	By	545b
New Phosphine G	C	75
New Polychromine FB	G	616
New Toluylene Brown OO	GrE	A465
New Toluylene Brown O	GrE	A464
New Toluylene Brown R	GrE	A466
New Victoria Black B	By	262
New Victorial Blue B	By	558
New Yellow for Cotton	WD	304
Niagara Black Blue R	Sch	441
Niagara Blue B, 2 B	Sch	337
Niagara Blue 4 B	Sch	426
Niagara Blue 6 B	Sch	424
Niagara Blue BR	Sch	386
Niagara Blue GW, HW, RW	Sch	336
Niagara Blue R	Sch	326
Niagara Fast Red FD	Sch	343
Niagara Violet 2 B	Sch	326
Niagara Violet 3 R	Sch	327
Nicholson Blue 4 B	P	536
Night Blue	B, I, S	560
Night Green A	[illegible]	[illegible]
Nigramine	CG	[illegible]
Nigrophor	B	218
Nigrosine	Var	698
Nigrosine	Var	700
Nigrosine (V. M.)	Var	698
Nigrosine (V. M.)	Var	700
Nigrosine spirit soluble	Var	698
Nigrosine, water soluble	Var	700
Nigrosines from aniline (indulines)	Sch	698
Nigrosines from nitrobenzol	Sch	700
Nile Blue A, B, R	B	653
Nile Blue 2 B	B	654
m-Nitraniline Orange	M	46
Nitro Azamine Green F	CV	A730
Nitrophenine	ClCo	51
Nitrosamine Pink BXF	B	96
Nitroso Blue MR	M	647
Nitrosamine Red	B	36
Nyanza Black B	A	265
Oil Black (V. M.)	CJ	U495
Oil Black (V. M.)	K	U369
Oil Black 6 B	B	U163
Oil Black 6 G	B	U164
Oil Black BG	B	U165
Oil Black 11410, 29494	H	U759
Oil Blue	B	U166
Oil Blue Black 114	K	U370
Oil Brown BG	K	U371
Oil Color Brown	H	U760
Oil Color Canary	H	U761
Oil Color Yellow	H	U762
Oil Orange	Var	38
Oil Orange (V. M.)	K	U372
Oil Orange AR	K	U372
Oil Orange LG	I	38a
Oil Orange R	B	U167
Oil Orange 3 R	B	U168
Oil Orange 2311	Sch	38
Oil Red (V. M.)	K	U373
Oil Red B	B	U169
Oil Red G	B	U170
Oil Red 7327	CJ	U496
Oil Yellow	Var	32
Oil Yellow (V. M.)	K	U374
Oil Yellow A	Sch	31
Oil Yellow G	B	U171
Oil Yellow R	B	U172
Oil Yellow 2338	Sch	30a
Oil Yellow 2625	Sch	32
Oil Yellow 2681	Sch	68
Oil Yellow 7809	I	32a
Old Gold	Q	U804
Oleate Green O	Q	U805
Omega Chrome Cyanine R	S	U711
Omega Chrome Red B	S	U712
Omega Chrome Black PV	S	85
Opal Blue	M	521
Opaline Blue R	I	U679
Orange A	Sch	145
Orange D	B	37a
Orange G	Var	38
Orange G	K	139a
Orange 2 G	H	38
Orange GC	K	139a
Orange GD	L	144a
Orange GRX	B	37
Orange GS	H	139
Orange GT	By	70
Orange N	I	139
Orange NA	GrE	79a
Orange PC	DH	145a

Name	Manufacturer	Serial No.
Orange R	Var	151
Orange 2 R	K	139a
Orange RO	B	151a
Orange RO	By	A277
Orange S	B	144
Orange T	K, tM	151
Orange TA	A, etc.	311
Orange X	H	37a
Orange I	Var	144
Orange II	Var	145
Orange III	P	47
Orange IV	Var	139
Orange 13	S	58c
Orange 14	S	58c
Orange 67 (V. M.)	C	38
Orange 227	Q	36b
Orange 23981	S	58c
Orange Crystals	AW	38
Orange Crystals 2 G	WD	38
Orange Red pure	A	174
Orchil RCEP	A	U48
Orchil OPAG	A	U47
Orchil RPH	A	U49
Oriol Yellow	G	199
Oriol Yellow EC	G	199
Orseilline BV	By	253
Ortho Black 3 B	A	A37
Ortho Cyanine B	A	A38
Ortho Cyanine 6 G	A	A39
Oxamine Acid Brown G	B	A87
Oxamine Black A	B	A88
Oxamine Black BB	B	A89
Oxamine Black BHN, BHX	B	333
Oxamine Black BBNX	B	A90
Oxamine Black BRTX	B	A91
Oxamine Black RN	B	A92
Oxamine Blue	B	421
Oxamine Blue A, AX	B	410
Oxamine Blue B	B	421
Oxamine Blue 3 B, BG, GNX, 3 R	B	421a
Oxamine Blue 4 R	B	385
Oxamine Brilliant Red BX	B	A93
Oxamine Brilliant Violet RX	B	A94
Oxamine Brown A	B	A95
Oxamine Brown G	B	A96
Oxamine Brown 3 G	B	A97
Oxamine Brown GR	B	A98
Oxamine Brown GX	B	A99
Oxamine Brown 3 GX	B	A100
Oxamine Brown R, RG	B	344
Oxamine Claret B	B	A101
Oxamine Copper Blue RR	B	A102
Oxamine Copper Blue RRX	B	A103
Oxamine Dark Blue BGX	B	A105
Oxamine Dark Blue BGE	B	A104
Oxamine Dark Blue BRRX	B	A107
Oxamine Dark Blue R	B	A106
Oxamine Dark Brown G	B	A108
Oxamine Dark Brown R	B	A109
Oxamine Fast Blue 6 VX	B	A110
Oxamine Fast Blue RR	B	A111
Oxamine Fast Pink BX	B	A112
Oxamine Fast Red F	B	343
Oxamine Green C	B	475
Oxamine Green B, BX	B	474
Oxamine Green G, GX	B	475
Oxamine Light Blue B	B	A113
Oxamine Light Blue GX	B	A114
Oxamine Light Brown G	B	A115
Oxamine Light Brown R	B	A116
Oxamine Light Green B	B	A117
Oxamine Light Green G	B	A118
Oxamine Light Green 3 G	B	A119
Oxamine Maroon	B	345
Oxamine Pure Blue 6 B, 6 BO, 6 BXX	B	424
Oxamine Red	B	346
Oxamine Red 3 B, BNX	B	346
Oxamine Violet	B	326
Oxamine Yellow A	B	A120
Oxamine Yellow 3 G	B	A121
Oxy Acid Red 6 BO	GrE	U512
Oxy Chlorazol Blue B	H	A760
Oxy Diamine Black (V.M.)	C	A382
Oxy Diamine Blue (V.M.)	C	A383
Oxy Diamine Brown (V.M.)	C	A384
Oxy Diamine Carbon (V.M.)	C	A385
Oxy Diamine Orange (V.M.)	C	362
Oxy Diamine Red S	C	A386
Oxy Diamine Violet (V.M.)	C	326
Oxy Diamine Yellow	C	198
Oxy Diaminogen (V.M.)	C	A387
Oxychrome Black F	GrE	A467
Oxychrome Blue Black BGO	GrE	A468
Oxychrome Brown V	GrE	A469
Oxychrome Brown VA	GrE	A470
Oxychrome Brown VN	GrE	A471
Oxychrome Yellow D	GrE	A472
Oxychrome Yellow DG	GrE	A473
Oxychrome Yellow 2 G	GrE	A474
Oxyphenine A, C, GG, R	ClCo	617
Pacific Blue	H	540
Palatine Black A, 4 B	B	220
Palatine Black 3 GX, MZ, SF, SFM	B	220
Palatine Chrome Black	B	288
Palatine Chrome Black 6 B, 6 BX	B	181
Palatine Chrome Black F	B	288
Palatine Chrome Black S	B	289
Palatine Chrome Blue BB	B	A122
Palatine Chrome Blue W 2 B	B	A123
Palatine Chrome Brown 5 G	B	154a
Palatine Chrome Brown GGTX	B	154a
Palatine Chrome Brown GGX, R	B	154a
Palatine Chrome Brown W	B	154
Palatine Chrome Brown WN	B	154
Palatine Chrome Brown WNR	B	154
Palatine Chrome Brown WNRTX	B	154
Palatine Chrome Green G	B	A124
Palatine Chrome Green GX	B	A125
Palatine Chrome Red B	B	202
Palatine Chrome Red R	B	A126
Palatine Chrome Violet	B	156
Palatine Light Yellow R	B	A127
Palatine Orange R	B	A128
Palatine Red A	B	109
Palatine Scarlet A	B	81
Palatine Scarlet G, 3 R, 4 R	B	81a
Palatinite	B	U173
Panama Black 3 G, R	Sch	436
Paper Blue 6 G	Sch	537
Paper Blue MD	M	U459
Paper Blue TRR	B	U174
Paper Blue 33598	S	U713
Paper Blues, green shades	Sch	537
Paper Blues, red shades	Sch	537
Paper Brown BB	B	U175
Paper Brown BL	B	U176
Paper Brown RT	B	U177
Paper Fast Bordeaux B	By	U255

Name	Manufacturer	Serial No.
Paper Green D	K	U375
Paper Orange CR	K	U376
Paper Orange residue	K	U377
Paper Red O	WD	307
Paper Scarlet (V.M.)	K	U378
Paper Yellow	Var	303
Paper Yellow	WD	303a
Paper Yellow G, GGX,RRX	B	303a
Paper Yellow 3 GX	B	303
Paper Yellow 3 RXX	B	303a
Para Black B	By	A278
Para Blue	CG	702
Para Brilliant Orange G	By	A282
Para Brown GK	By	A279
Para Brown RK	By	A280
Para Brown SC	By	A281
Para Diamine Black (V.M.)	C	A388
Para Green 2 BL	By	A283
Para-Fuchsine	Var	511
Para Magenta	H	511
Para Orange G	By	A284
Para Yellow	AW	U588
Paramine	B	U178
Paranitraniline Red	Var	56
Paraphenylene Blue R	WD	701
Paraphenylene Violet	WD	695
Paraphosphine (V. M.)	C	U294
Para Red	Var	56
Paratol Chrome Yellow L	M	U460
Paratol Fast Yellow G	M	U461
Paratol Lake Red KP	M	U462
Paratol Lake Red LC	M	U463
Paratol Lake Red LP	M	U464
Paratol Scarlet 3 B, 3 BX	M	U465
Parazole Brown RK	K	U379
Paris Violet	P	515
Paris Violet 3 B, 6 B, 3 BA	P	515
Paris Violet 4 BA, 4 R, 90	P	515
Patent Alizarin Black DEB, DFF, DFFA	M	807a
Patent Black (V. M.)	C	U295
Patent Blue	...	543
Patent Blue A	Var	545
Patent Blue AE	M	545
Patent Blue B	A, M	543
Patent Blue L, LE, NO	M	543
Patent Blue V	Var	543
Patent Blue V new	M	543
Patent Blue J 3, JI, WE	M	543a
Patent Marine Blue	M	543
Patent Marine Blue LER	M	543b
Patent Phosphine G, GG, M, R	I	606
Patent Phosphine 19332	I	606c
Pegu Brown G	L	A511
Peri Wool Blue B	C	87
Permanent Blue GR	CG	U493
Permanent Orange R	A	131
Permanent Red	A	152
Permanent Red B, 2 B, R, 4 R	A	152a
Permanent Red 4 B	A	152
Persian Red RD	B	U179
Phenamine Blue G	B	A129
Phenanthrene Chrome Blue	I	U680
Phenochrome Yellow	K	U380
Phenocyanine TC, R, VS	DH	642
Phenocyanine TV	DH	643
Phenylamine Black 4 B	By	A285
Phenyl Crimson S	CV	A731
Phenylene Black	P	267
Phenylene Blue	BK	649
Philadelphia Yellow 2 G	A	606
Phloxine	DH,M	593
Phloxine B, GA, HM	M	596
Phloxine P	B	593
Phoenix Brown D	A	U58
Phosphine (V. M.)	Var	606
Phosphine A	GrE	606
Phosphine AR, GG	tM	606
Phosphine G	S	606
Phosphine GO	K	606
Phosphine LM, O	M	606
Phosphine LB, PHLB	GrE	606
Phosphine 3 R	A	606
Phosphine RS	H	606
Phosphine 12901	P	606
Picric Acid	...	5
Pigment Black	B	U180
Pigment Black BP	B	U181
Pigment Chlorine	M	8
Pigment Chrome Yellow L	M	21
Pigment Fast Red HL	M	73
Pigment Fast Yellow G	M	28
Pigment Fast Yellow R	M	24
Pigment Orange R	M	72
Pigment Purple A	M	93
Pigment Scarlet G	M	201
Pigment Scarlet 3 B	M	202
Pinachrome	M	613a
Pinacyanol	M	U466
Pink	K	U381
Pink B	I	U681
Pink M	H	U763
Pink Color	Q	U806
Pluto Black A	By	A286
Pluto Black BS	By	A287
Pluto Black CF	By	A288
Pluto Black F	By	A289
Pluto Black G	By	A290
Pluto Black SS	By	A291
Pluto Brown GG	By	A292
Pluto Brown NB	By	A293
Pluto Brown R	By	A294
Pluto Milling Black B	By	A295
Pluto Orange G	By	392
Plutoform Black 3 GL	By	A296
Polar Orange GS	G	U633
Polar Red 3 B	G	U635
Polar Red G	G	U636
Polar Red R	G	U637
Polar Red RS	G	U638
Polar Yellow G	G	U639
Polar Yellow 2 G	G	U640
Polar Yellow R	G	U641
Polar Orange RC	G	U634
Polychromine AC	G	616
Polychromine B	G	13
Polyphenyl Black BVC	G	A650
Polyphenyl Black GNC	G	A651
Polyphenyl Blue GC	G	A652
Polyphenyl Blue GF	G	A653
Polyphenyl Brilliant Blue 3 G	G	A654
Polyphenyl Fast Red BC	G	A655
Polyphenyl Orange RC	G	A656
Polyphenyl Yellow 3 GC	G	A657
Ponceau (V. M.)	K	83a
Ponceau BO	A	227
Ponceau G	M	39
Ponceau 4 GB	A, etc.	37
Ponceau K	I	175a
Ponceau R, 2 R	I	82
Ponceau 3 R	Var	83
Ponceau 4 R	Var	83
Ponceau 4 R	P	169
Ponceau 5 R	M, K	228

Name	Manufacturer	Serial No.
Ponceau 6 R	B, M	170
Ponceau 3 RB	A	247
Ponceau 4 RB	A	249
Ponceau 6 RB	A	255
Ponceau 10 RB	A	259
Ponceau RL, 2 RL, 3 RL, 2 RLH	A	82a
Ponceau 2 RL	By	82
Ponceau S	A	247a
Ponceau SPJ	P	169b
Ponceau S 2 R	B	82
Ponceau W 3 R	P	169b
Ponceau X	BK	82b
Ponceau 12402	I	175a
Ponceau for Silk	P, K	175
Ponceau (free from arsenic)	WD	82c
Potting Black B	I	184
Prague Alizarin Yellow G	Ki	49
Primal Black	A	U59
Primazine Yellow G	B	A130
Primuline	Var	616
Primuline A	B, M	616
Primuline (V. M.)	Var	616
Primuline Yellow	AW,By	616a
Printing Black for Wool	B	776
Printing Blue for Wool	B	742
Printing Yellow (greenish)	K	U382
Prune 516	Lev	636
Prune pure	S	636
Pure Blue AI	I	539
Pure Blue DS, DSG	H	539
Pure Blue RT	BK	539
Pure Soluble Blue	C	539
Pure Yellow DG	K	U383
Purpurin (synthetic)	B	783
Pyramidol Brown BG	FA	317
Pyramidol Brown T	FA	376
Pyramine Orange 2 GX	B	362a
Pyramine Orange 3 G	B	306
Pyramine Orange R	B	360
Pyramine Orange RR	B	314
Pyramine Orange RT	B	362
Pyramine Yellow GXS, GXSC	B	304
Pyramine Yellow GXSP	B	304
Pyramine Yellow R, RX	B	191
Pyrazole Orange G	S	392
Pyrazole Orange R	S	A722
Pyrogallol-cyanine-sulphonic acids	DH	623
Pyrogene Black G	I	730
Pyrogene Blue	I, C	726
Pyrogene Blue RR, 2 RN	I	726
Pyrogene Blue Green B	I	746
Pyrogene Brown D	I	S155
Pyrogene Brown G	I	S156
Pyrogene Brown GX	I	S157
Pyrogene Brown OR	I	S158
Pyrogene Brown ORR	I	S159
Pyrogene Brown 4 R	I	S160
Pyrogene Cutch DR	I	S161
Pyrogene Cutch 2 GO	I	S162
Pyrogene Cutch 2 R	I	S163
Pyrogene Dark Green B	I	746
Pyrogene Deep Black C, D, G	I	720
Pyrogene Direct Blue	I	726
Pyrogene Direct Blue, green shade	I	726
Pyrogene Direct Blue, red shade	I	726
Pyrogene Direct Blue RL	I	726
Pyrogene Green G	I	746
Pyrogene Green 2 G	I	709
Pyrogene Green 3 G	I	746
Pyrogene Indigo	I	735
Pyrogene Indigo CL, 5 G, GL	I	735
Pyrogene Indigo R, RR	I	735
Pyrogene Olive 3 G	I	746
Pyrogene Orange R	I	S164
Pyrogene Yellow M, O, 3 R	I	734
Pyrol Brown G	L	S135
Pyrol Brown 69181	L	S136
Pyrol Brown (yellowish)	L	S135
Pyronine G	L, By	568
Pyrophosphine C	WD	U547
Quercitron Substitute V	B	U184
Quercitron Substitute WBL	B	U183
Quinoline Blue	G	611
Quinoline Red	A	610
Quinoline Yellow	A	612
Quinoline Yellow	AW	613
Quinoline Yellow	B	612
Quinoline Yellow	By	613
Quinoline Yellow	C	613
Quinoline Yellow	I	613
Quinoline Yellow	M	613
Quinoline Yellow	S	612
Quinoline Yellow KT, N	By	613
Quinoline Yellow O	M	613
Quinoline Yellow P	B	612
Quinoline Yellow 9272	I	612
Quinoline Yellow, spirit soluble	Var	612
Quinoline Yellow, water soluble	Var	613
Radial Yellow G	B	30
Rapid Filter Green I	M	U467
Rapid Filter Red I	M	U468
Raven Black 34588	H	U764
Red (V. M.)	CJ	U497
Red PC	DH	U600
Red PC	G	U642
Red 2 S	P	483a
Red Blue BSR	GrE	U513
Red Brown	S	106c
Red Coralline	...	556
Red for Leather O	M	U469
Red for Leather R	A	U60
Red Lake RL	By	U256
Red Lake RMT	By	U257
Red Violet	tM	514
Red Violet 5 R	B	514
Red Violet 5 RS	B	525
Reddish Brown	K	U384
Renol Black BHN	tM	462b
Renol Black SF, ST	tM	462b
Renol Blue B	tM	410
Renol Bordeaux	tM	A517
Renol Brilliant Yellow	tM	303
Renol Brown MB, RA	tM	344
Renol Dark Green NOONG	tM	A518
Renol Fast Red 4 B	tM	A519
Renol Green B	tM	475
Renol Light Blue A	tM	A520
Renol Light Blue G	G	A658
Renol Light Blue G	tM	A521
Renol Orange 3 AP	G, tM	392a
Renol Red	tM	A522
Renol Yellow 3 R	tM	9
Renolamine Black BHN	G, tM	333
Resoflavin W	B	771
Resorcin Blue	M	647
Resorcin Brown	Var	211
Resorcin Brown G	G	211
Resorcin Brown QV	G	211
Resorcin Dark Brown	BK	213

Name	Manufacturer	Serial No.
Resorcin Yellow	Sch	143
Rheonine	B	607
Rheonine AL, GD	B	607
Rhine Blue	Q	631
Rhodamine AL	B	572a
Rhodamine B	Var	573
Rhodamine 3 B	I, B	574
Rhodamine BN	Q	573
Rhodamine BSP	M	573
Rhodamine G	Var	572
Rhodamine 3 G	B	576
Rhodamine 5 G	By	576a
Rhodamine 5 G	S	572a
Rhodamine 6 G	Var	571
Rhodamine 12 GF	I	578
Rhodamine 6 GN	B	571
Rhodamine S	B, By	570
Rhodamine S	I	570
Rhodamine SP	B	570
Rhodamine R	I	572a
Rhodamine 6302	Q	572a
Rhodamine Scarlet G	By	576b
Rhodine 2 G	I	577
Rhodine 12 GM	I	575
Rhoduline Blue 6 G	By	U258
Rhoduline Heliotrope 3 B	By	U259
Rhoduline Orange N, NO	By	603a
Rhoduline Red B, G	By	684
Rhoduline Violet	By	684
Rhoduline Yellow 6 G	By	618a
Roccelline	C, FA	161
Roccelline FS	H	161
Roccelline MB	tM	161
Roccelline S	G, tM	161
Rosanthrene AWL	I	A704
Rosanthrene B	I	A705
Rosanthrene CB	I	A706
Rosanthrene R	I	A707
Rosanthrene Bordeaux B	I	A708
Rosanthrene Orange 16754	I	A709
Rosanthrene Violet SR	I	A710
Rosazeine B	M	573
Rosazeine B 5	M	U471
Rosazeine 6 G	M	U472
Rosazurine B	A, By	372
Rosazurine G	A, By	371
Rose (V. M.)	CJ	U498
Rose Bengal	Var	595
Rose Bengal	G, M	597
Rose Bengal B	B, L	597
Rose Bengal B	K, M	597
Rose Bengal N	C	595
Rose Bengal NTO	B	595
Rose Magdala	DH	694
Roseine B	S	512
Rosinduline	K	674
Rosinduline 2 B	K	673
Rosinduline G	K	675
Rosinduline 2 G	K	674
Rosolane	P	688
Rosolane B, O	M	687
Rosolane O, T, R	M	687
Rosophenine 4 B	ClCo	483
Rosophenine 10 B	ClCo	194
Rosophenine SG	ClCo	195
Rubine	A	512
Rubine N	A	512
Rubine N	B	U189
Rubramine	CG	703
Russian Leather Red R	A	512
Russian Red	C	512
Saba Phosphine G, GG	S	606
Safranine	Var	679
Safranine (V. M.)	Var	679
Safranine B	Var	679
Safranine 6 B	Sch	680
Safranine FF	By	679
Safranine F	K	679
Safranine FB	B	679
Safranine MN	B	683
Safranine O	M	679
Safranine T, TK	B	679
Safranine Y	Sch	679
Safranine Z	...	679
Safranine 1081	K	679
Safranine bluish	K	680
Safranine (blue shade)	L	679
St. Denis Black B	P	718
St. Denis Red	P	483
Salicine Black (V. M.)	K	181b
Salicine Black K, LR, S	K	181b
Salicine Black U, UL	K	181
Salicine Blue B	K	A403
Salicine Bordeaux R	K	A404
Salicine Brown (V. M.)	K	A405
Salicine Dark Green CS	K	276
Salicine Green CP	K	A407
Salicine Orange 2 R	K	A408
Salicine Orange 2541, 2542	K	A409
Salicine Red B	K	A410
Salicine Red G	K	A411
Salicine Violet R	K	A412
Salicine Yellow (V. M.)	K	177b
Salmon Red	A	120
Scarlet	CDCo	174
Scarlet (V. M.)	C	247
Scarlet AB	GrE	A475
Scarlet 6 B	GrE	A476
Scarlet BN	B	A131
Scarlet C	Q	196a
Scarlet EC	C	247
Scarlet GA	B	A132
Scarlet GRCL, M	M	174a
Scarlet GX	K	U385
Scarlet 15 N	B	A133
Scarlet P	K	U385
Scarlet PO, 2 PR	K	U385
Scarlet R, 2 R	M	174a
Scarlet R, 2 R	Var	82
Scarlet 2 R	K	U385
Scarlet 2 R	tM	176
Scarlet 3 R, 6 R, 2 RCL, 3 RCL	M	174a
Scarlet 3 R	B	83
Scarlet 4 R	Q	83
Scarlet 4 R	P, tM	176a
Scarlet 6 R crystals	BK	223b
Scarlet RD	H	82d
Scarlet 4 RI, 2 RII	AW	106b
Scarlet 4 RZ	M	174a
Scarlet S 2 R	B	A134
Scarlet S 3 R	B	A135
Scarlet 2 SRM	B	A136
Scarlet X, XX	K	U385
Scarlet 50	H	169
Scarlet 231, 243	CJ	76a
Scarlet 1610	K	U385
Scarlet 7214	B	A137
Scarlet 53446	A	U61
Scarlet (yellow shade) 17413	B	A138
Scarlet (yellow shade) 24211	B	A139
Scarlet for silk S	P	247c
Scarlet residue	K	U385
Seal Brown W	P	U594
Sella Brilliant Yellow P	G	U643
Sella Flavine G	G	U644

Name	Manufacturer	Serial No.
Sepia Black FW, 14998	I	U682
Serge Blue	A	539
Setocyanine O	G	500
Setoglaucine O	G	496
Setopaline	G	500
Silk Blue	tM	539a
Silk Blue B	B	537
Silk Blue B	BK	559
Silk Blue B	Q	539
Silk Blue BJBNOO	GrE	539a
Silk Blue BS3BB, BT5BOO BTR	GrE	539a
Silk Blue BTB, BTR	GrE	539a
Silk Blue 4 R	Q	539
Silk Blue 4	By	537
Silk Blue 5770	BK	559
Silk Gray CB, 281	K	U386
Silk Wool Black 3 B	M	U473
Silk Yellow N	BK	613
Silk Yellow N	Q	U811
Silver Gray N	C	700
Silver Gray P	A	700
Sirius Yellow G	B	758
Sitara Fast Red RL	tM	56
Sitara Orange I	tM	A523
Sky Blue FFO	S	424
Solamine Blue B	A	A44
Solamine Red	A	A44a
Solfigene Blue Green B	I	U684
Solfigene Blue Green 16444	I	U683
Solfigene Cutch	I	U685
Solfigene Cyanine	I	U686
Solfigene Deep Black (V.M.)	I	U688
Solfigene Deep Black 14717	I	U687
Solfigene Green GG	I	U689
Solid Blue (V. M.)	C	U296
Solid Blue 3 R	S	699
Solid Blue RX	Q	699
Solid Blue SBAOOOO	GrE	699
Solid Blue SBSOOO	GrE	699
Solid Blue Base SBXBX	GrE	699
Solid Brown	Q	U812
Solid Brown KF	Q	U813
Solid Brown O	M	U474
Solid Green (V. M.)	C	495
Solid Green 3 G	Q	499
Solid Green O	M	1
Solid Red B	Q	U814
Solid Yellow G	Q	137
Soluble Blue	ByCo	537
Soluble Blue	Var	539
Soluble Blue	H&M	537
Soluble Blue (V. M.)	Var	539
Soluble Blue AOOOO	GrE	539
Soluble Blue B, BCBII	CG	539
Soluble Blue BLSE, 3 BS	P	539
Soluble Blue BS 3B B, BSJ	GrE	539
Soluble Blue C 2, C 3, C 5, CX	K	539
Soluble Blue ELOOO	GrE	539
Soluble Blue HA, IN, 4 R, TB, TL	B	539
Soluble Blue 5 R	tM	539
Soluble Blue RM	M	539
Soluble Blue base SBXR	GrE	539
Soluble Blue crystals	tM	539
Soluble Blue (greenest shade)	tM	539
Soluble Navy Blue	G	539c
Sorbin Red	B	64
Sorbin Red X	B	64
Special Blue G	B	U190
Special Phosphine G	S	606
Spirit Black	G	U645
Spirit Black (V. M.)	CJ	U499
Spirit Blue	Var	521
Spirit Blue BVE	P	521
Spirit Blue R	M	521
Spirit Blue, green shades	Sch	521
Spirit Blue, red shades	Sch	521
Spirit Nigrosine	WD	698
Spirit Nigrosine LM, P	H	698
Spirit Yellow	L, tM	31
Spirit Yellow R	K	68
Stanley Red	ClCo	193
Steam Green G	B	U191
Stilbene Yellow	Var	10
Stilbene Yellow 3 G	ClCo	10
Stilbene Yellow 3 G	CR	10
Stilbene Yellow 2 GP, 3 GPX, GX	B	10
Stilbene Yellow RX	B	10a
Stilbene Yellow 5912	B	10b
Straw Blue G	By	U260
Sudan G, 2 G	A	35
Sudan R	A	93
Sudan I	A	36
Sudan II	A	76
Sudan III	A, etc.	223
Sudan IV	A, etc.	232
Sudan Brown	A	105
Sudan Brown S	Sch	105
Sulfamine Brown A	WD	107
Sulfamine Brown B	WD	116
Sulfaniline Brown O, R	K	708
Sulfine Blue B	CG	S125
Sulfine Blue RR	CG	S126
Sulfine Brown	...	707
Sulfine Brown	CG	737
Sulfine Brown B, G	CG	737
Sulfo Blacks B, 2 B	H	744
Sulfo Green B, C	NF	U550
Sulfo Rhodamine B	M	579
Sulfo Rosazeine B	M	U475
Sulfo Rosazeine G	M	U476
Sulfogene Brown G, D	I	757
Sulfoline G	AW	U589
Sulfoline G	K	U387
Sulfoline R	AW	U590
Sulfon Acid Black N 2 B	By	U261
Sulfon Acid Blue B	By	189
Sulfon Acid Blue R	By	188
Sulfon Acid Green B	By	U262
Sulfon Black 3 B	By	256
Sulfon Black G	By	242
Sulfon Blue R	By	188
Sulfon Orange G, 5 G	By	A297
Sulfon Violet R	By	A298
Sulfon Yellow 5 G, R	By	A299
Sulfonazurine	By	361
Sulfoncyanine	Var	257
Sulfoncyanine BB, GR, 5 R, SR	B	257a
Sulfoncyanine G, GR, 5 R, 5 RT	By	257
Sulfoncyanine Black B, 2 B	By	265
Sulfoncyanine Black BB, GR	B	265a
Sulfur Black	Var	720
Sulfur Black	WD	721
Sulfur Black	A	720
Sulfur Black A, AW, AWL	A	720
Sulfur Black B, 2 B, 4 B	A	720
Sulfur Black 2 B, BR, BRH, GF	K	720
Sulfur Black FAG, FT	A	720
Sulfur Black H, JBL	A	720

Name	Manu-facturer	Serial No.
Black KCB, MA	K	720
Black T, TFA, TG	A	720
Black TR	Lev	720
Black TS, 5274, 5276	K	720
Black 5285, 5289	K	720
Sulfur Black 108583	A	720
fu k Brown N	A	S1
u k Brown NR	A	S2
u	A	S3
	BK	S123
CHL	K	S83
D	A	S4
G	K	S83
Blue L	A	S6
Blue PR	A	S7
Blue R	A	S8
Blue 2 R	A	S9
Blue 4 R	A	S10
Blue RR	BK	S124
Blue U	K	S83
Brilliant Green GK	A	S11
fur Bronze 136	Lev	S168
Bronze 158	Lev	S169
Brown CL 4 R	A	S12
Brown G	A	S13
Brown 2 G	A	S14
fur Brown 6 G	A	S15
fur Brown M	I	S165
fur Brown O	A	S16
fur Brown OB	A	S17
fur Brown 527	Lev	S170
fur Brown 731	Lev	S171
fur Brown (bluish)	K	S84
fur Brown (reddish)	K	S84
ulfur Catechu G	A	S18
Sulfur Catechu R	A	S19
Sulfur Corinth B	A	S20
Sulfur Corinth CLB	A	S21
Sulfur Green 2 BK	A	S22
Sulfur Green 4 BK	A	S23
Sulfur Green G	A	S24
Sulfur Green 4 GK	A	S25
Sulfur Green 309	Lev	S172
Sulfur Green 330	Lev	S173
Sulfur Indigo BA	A	S26
Sulfur Indigo CL	A	S28
Sulfur Indigo CLGG	A	S29
Sulfur Indigo Blue RCL	K	S85
Sulfur Indigo Blue 827	K	S85
Sulfur Olive	S	S167
Sulfur Olive B	A	S30
Sulfur Red Brown 2 RK	A	S31
Sulfur Red Brown 6 RK	A	S32
Sulfur Violet R	A	S33
Sulfur Violet Y	A	S34
Sulfur Yellow ES	K	U388
Sulfur Yellow G	S	712
Sulfur Yellow G	A	S35
Sulfur Yellow G	K	U388
Sulfur Yellow 4 G	A	S36
Sulfur Yellow I	A	S37
Sulfur Yellow R	A	S38
Sulfur Yellow R	I	S166
Sultan 5 B	H	363
Sultan 10 B	H	405
Sultan Orange DS	H	304d
Sultan Yellow H	H	304
Sun Yellow	Var	9
Sun Yellow G, GS, RR	S	9
Sun Yellow 3 GC	G	9
Supramine Brown R	By	U263
Supramine Yellow R	By	U264
Tabora Black X	A	A45
Tannin Heliotrope	C	685
Tannin Orange R	C	74
Tannin Orange R	S	606
Tartrazine	Var	23
Tartrazine G, X, XX	B	23
Terra Cotta FC	G	209
Terra Cotta 2 RN, RGN	G	58
Tetracyanol A	C	545
Tetracyanol SFV	C	543
Thiazine Blue	G	A659
Thiazine Brown R	B	U192
Thiazine Red G	B	197
Thiazine Red R	B	194
Thiazine Yellow G, 3 G, GL	By	198
Thiazol Yellow G	S	198
Thiazol Yellow GR	BD	198
Thiazol Yellow R, RH	By	51
Thiocarbone NNG	C	720
Thiocarmine R	C	662
Thio Catechine	P	715
Thio Cotton Black	WD	721
Thioflavine (V. M.)	C	618
Thioflavine OIO	K	615
Thioflavine S	S, C	615
Thioflavine T	C	618
Thioflavine 654	K	615
Thiogene Black BB, 5 B	M	720
Thiogene Black M, MA, MM	M	720
Thiogene Black ML, MZ	M	720
Thiogene Blue RL	M	S99
Thiogene Blue R	M	S97
Thiogene Blue 2 R	M	S98
Thiogene Cyanine B	M	S107
Thiogene Cyanine G	M	S108
Thiogene Dark Red G	M	S109
Thiogene Deep Blue BR	M	S111
Thiogene Deep Blue	M	S110
Thiogene Green BL	M	S112
Thiogene Green G	M	S113
Thiogene Green GG	M	S114
Thiogene Green GL	M	S115
Thiogene Khaki N	M	S116
Thiogene New Blue JL	M	S117
Thiogene Olive Green GGN	M	S118
Thiogene Orange R	M	S119
Thiogene Violet V	M	S120
Thiogene Yellow GG	M	S121
Thiogene Yellow 5 G	M	S122
Thiogene Brown G	M	S100
Thiogene Brown GG	M	S102
Thiogene Brown GC	M	S101
Thiogene Brown GR	M	S103
Thiogene Brown G 2 R	M	S104
Thiogene Brown R	M	S105
Thiogene Brown S	M	S106
Thio Indigo Brown G	K	904
Thio Indigo Brown 2 R	K	902
Thio Indigo Orange R	K	913
Thio Indigo Pink 247, 2475	K	910
Thio Indigo Pink Rose BW	K	910
Thio Indigo Red B	K	912
Thio Indigo Red 3 B	K	918
Thio Indigo Rose AN, BN	K	910
Thio Indigo Scarlet G	K	906
Thio Indigo Scarlet R	K	905
Thio Indigo Scarlet S, 6086	K	916
Thio Indigo Violet 2 B	K	920
Thio Indigo Violet K	I, K	900
Thio Indigo Yellow 3 GN	K	913a
Thional Black G	S	719
Thional Brilliant Green 29	S	746
Thional Brown	S	747

Name	Manufacturer	Serial No.
Thional Brown G	S	747
Thional Dark Green GN	S	746
Thional Green	S	746
Thional Green GG	S	746
Thional Red Brown	S	747
Thion Black (V. M.)	K	720
Thion Blue B	K	736
Thion Brown (V. M.)	K	S86
Thion Dark Blue BO	K	S87
Thion Direct Blue	K	736a
Thionine Blue GO	A, M	661
Thionine Blue OO, 3 O	A	661
Thion Green 2 G	K	S88
Thion Green 829	K	S89
Thion Navy Blue (V. M.)	K	S90
Thionol Black	Lev	719
Thionol Black S, XX	Lev	720
Thionol Yellow GR	Lev	198
Thion Orange (V. M.)	K	S91
Thion Purple O	K	S92
Thion Violet	K	S93
Thion Violet Black	K	720
Thion Yellow (V. M.)	K	S96
Thion Yellow 2 G	K	S94
Thion Yellow 5 G	K	S95
Thiophenol Black T	I	720
Thiophor Black WLN	CJ	720
Thiophor Blue B	CJ	S127
Thiophor Bronze 5 G	CJ	713
Thiophor Dark Brown B	CJ	S128
Thiophor Deep Green CG	CJ	S129
Thiophor Indigo CJ	CJ	731
Thiophor Khaki	CJ	S130
Thiophor Orange O	CJ	S131
Thiophor Yellow R	CJ	S132
Thiophor Yellow Bronze G	CJ	714
Thiophor Yellow Olive	CJ	S132a
Thio Vesuvine BB	Q	U815
Thioxine Black ABOOOO	GrE	720
Thioxine Black ABBOOOO	GrE	720
Thioxine Black 3 BOOO	GrE	720
Thioxine Black GB, 1151, 3705	GrE	720
Thioxine Brown 5 G	GrE	S133
Thioxine Brown 2 GR	GrE	S134
Titan Como 2 B	H	A761
Titan Como R	H	A762
Titan Fast Black B	H	A763
Titan Orange	H	A764
Titan Red	H	196
Titan Scarlet Y	H	196
Titan Yellow G, Y	H, BD	198
Tolamine Violet	I	U690
Tolane Red B, G	K	43
Toluidine Blue	B, M	659a
Toluylene Black GOO	GrE	A477
Toluylene Brown G	GrE	285
Toluylene Brown R	GrE	488
Toluylene Fast Brown 2 R	By	U266
Toluylene Fast Brown 3 G	By	U265
Toluylene Fast Orange GL	By	392d
Toluylene Orange	Var	392
Toluylene Orange G	Var	392
Toluylene Orange GOO	GrE,S	392
Toluylene Orange R	M	287
Toluylene Orange RR	GrE	287
Toluylene Red OO, RT	GrE	358
Toluylene Yellow	GrE	286
Toluylene Yellow OO	GrE	286
Tolyl Black B, BB, BG	M	265
Tolyl Blue 5 R	M	257
Tolyl Blue SB	M	189
Tolyl Blue SR	M	188
Tolyl Blue ST, 7656	M	257b
Tonka Brown GS	I	U691
Triazol Blue B	GrE	A478
Triazol Blue BOO	GrE	A479
Triazol Blue BBOO	GrE	A480
Triazol Blue 4 BOO	GrE	A481
Triazol Blue R	GrE	A482
Triazol Blue 3242	GrE	A483
Triazol Bordeaux B	GrE	A484
Triazol Brown GOOA	GrE	A485
Triazol Brown GOOO	GrE	A486
Triazol Brown HRO	GrE	A487
Triazol Brown SOOO	GrE	A488
Triazol Dark Blue BHOOO	GrE	A490
Triazol Dark Blue BHPOOOO	GrE	A491
Triazol Dark Blue BHTOOO	GrE	A492
Triazol Dark Blue BOO	GrE	A489
Triazol Dark Blue 3 G	GrE	A493
Triazol Dark Blue ROO	GrE	A494
Triazol Fast Red L	GrE	343
Triazol Fast Yellow 2 GOOOO	GrE	617
Triazol Green B	GrE	474
Triazol Green BPOO	GrE	A495
Triazol Green GPOO	GrE	A496
Triazol Pure Blue 3 B	GrE	A497
Triazol Pure Blue R	GrE	A498
Triazol Red B	GrE	319
Triazol Violet R	GrE	A499
Triazol Violet RR	GrE	A500
Triazol Yellow NBPOO	GrE	304
Trisulfon Blue B	S	409
Trisulfon Blue 3 G	S	409a
Trisulfon Blue R	S	378
Trisulfon Brown	S	449
Trisulfon Brown A, B, MB	S	449
Trisulfon Brown G	S	454
Trisulfon Brown GG	S	457
Trisulfon Violet B	S	322
Tropæoline (V. M.)	C, etc.	143
Tropæoline OO	H	139
Trypan Blue	M	391
Trypan Red	M	359
Turmeric Yellow OOO	I	U692
Turquoise Blue	Q	498
Turquoise Blue B, BB, G	By	498
Tuscaline Orange G	B	99
Typophor Black FB	B	U193
Typophor Brown FR	B	U195
Typophor Black F 3 R	B	U194
Typophor Brown FB	B	U196
Typophor Red FG	B	U197
Typophor Yellow FR	B	U198
Typophor Yellow F 3 R	B	U199
Ultra Flavine SD	S	U714
Ultra Orange R	S	58
Ultra Violet B	S	632a
Ultra Violet FKN	K	632a
Ultra Violet LGP	S	632
Ultra Violet MO	S	635
Ultra Violet 943	K	632a
Ultracyanine B	S	644
Union Acid Black BH, GH	H	462e
Union Black	C	462d
Union Black BRN	S	462d
Union Black SOJ	A	462d
Union Blue H	S	126a
Union Blue R	M	126
Union Blue R	K	126a
Union Blue (V. M.)	C	126a
Union Fast Claret	Lev	238
Union Red B	K	A412a

Name	Manufacturer	Serial No.
Union Red BS	K	A412b
Universal Black B	By	U267
Urania Blue	WD	665
Uranine	A, etc.	585
Uranine A	B	585
Uranine N	M	585
Ursol	...	923
Ursol A	A	923
Ursol ADF	A	923
Ursol D	A	923
Ursol DB	A	923
Ursol DF	A	923
Ursol GG	A	923
Ursol P	A	923
Ursol PP	A	923
Ursol Gray AL	A	923
Varnish Black	WD	U548
Varnish Black 5 R	Q	U816
Vesuvine (V. M.)	B	284
Victoria	G	169
Victoria Black B	By	262
Victoria Blue B	Var	559
Victoria Blue B base	Var	559
Victoria Blue BE, BS, BSS	B	559
Victoria Blue R	Var	558
Victoria Blue 4 R	Var	522
Victoria Blue Base	S	559a
Victoria Blue Base 61272	H	559a
Victoria Brilliant Blue B	M	559b
Victoria Fast Violet B	By	U268
Victoria Fast Violet 2 R	By	U269
Victoria Green	Var	497a
Victoria Green BF	B	497a
Victoria Green 4833, 4834	By	497a
Victoria Green Base	B, tM	497a
Victoria Navy Blue L	By	U270
Victoria Pure Blue B	B	559
Victoria Scarlet R	M	A439
Victoria Scarlet 2 R, 4 R	tM	169
Victoria Scarlet 3 R	M	A440
Victoria Violet (V. M.)	Var	61
Victoria Yellow	M	134
Vidal Black I	P	717
Vigoureux Brown I	M	U477
Vigoureux Fast Black T	M	159a
Vigoureux Green B	C	U299
Violamine B	M	580
Violamine 3 B	M	584
Violamine R	M	582
Violet 2 B	K, tM	516a
Violet 6 B	Q	517
Violet DV	Q	516a
Violet NX	AW	516a
Violet 9 O, 300 XE	P	516a
Violet 55396	H	516a
Violet Base 2 B	Q	516a
Violet Base 5747	BK	516a
Violet Black	B	290
Violet Crystals	S	516
Violet Crystals	K	516
Violet Crystals 5 BO, 6 BO	I	516
Violet Crystals O	M	516
Violet Crystals 142 S	K	516
Violet Direct VR	G	A660
Violet Modern N	DH	624
Violet Neutral O	M	516a
Violettine 3 R	AW	U591
Viridanthrene B	B	765
Vitoline Yellow 5 G, R	tM	606
Vulcan Blue BO	Lev	U740
Vulcan Blue G	Lev	U741
Water Blue	C, etc.	539
Water Blue MX	Q	539
Water Blue S 2 K	A	539
Wood Red 40 F	Sch	168
Wool Black (V. M.)	K	U390
Wool Black (V. M.)	Lev	220b
Wool Black (V. M.)	Q	220b
Wool Black 6 A, 6 AN	tM	217g
Wool Black B, 2 B	A	220b
Wool Black B	K	U390
Wool Black BB	AW	272c
Wool Black 3 B	Lev	220b
Wool Black 4 B, 6 B, 4 BC	A	220
Wool Black 4 B	I	272c
Wool Black 10 B	tM	217g
Wool Black 4 BFL, 6 BS, 4 BX	A	220
Wool Black CD, CL	K	U390
Wool Black DW	BK	269
Wool Black G, GR, GRF	A	220b
Wool Black 6 G	G	U646
Wool Black GG	tM	217
Wool Black HN	tM	217g
Wool Black LR	K	U390
Wool Black MX	Q	220b
Wool Black N	M	A441
Wool Black NN	I	272e
Wool Black N 4 B	By	A301
Wool Black NC	K	U390
Wool Black NP	By	A302
Wool Black NP	CG	272c
Wool Black NR	K	U390
Wool Black SG	GrE	272e
Wool Black V	K	U390
Wool Black 9904	BK	269
Wool Black (greenish)	K	U390
Wool Blue	C	U300
Wool Blue	Q	538b
Wool Blue (V. M.)	K	U391
Wool Blue (V. M.)	Lev	565a
Wool Blue B	AW	565
Wool Blue 2 B, 5 B, G	A	565
Wool Blue 2 BX	A	565a
Wool Blue G, 2 G, G 446 N	K	U391
Wool Blue M	AW	562b
Wool Blue N	By	562
Wool Blue R, RX	A	565a
Wool Blue R	By	562b
Wool Blue 5 R	H	538
Wool Blue S	K	U391
Wool Blue S	Q	538b
Wool Blue 2 S	K	U391
Wool Blue SB	AW	562b
Wool Blue SDOO, SLOO	B	530d
Wool Blue SR	By	562
Wool Blue TB	K	U391
Wool Blue 1092	A	565a
Wool Blue Black 2019	K	U392
Wool Brown MC, P, SVR, UB, 2808	K	U393
Wool Canary OD	H	U765
Wool Cerise SR	K	U394
Wool Claret 21 B	Lev	U742
Wool Claret Red 87 B, 211, 357	Lev	U743
Wool Fast Black B	B	U200
Wool Fast Blue BL	B	U201
Wool Fast Blue BL	By	U271
Wool Fast Blue GL	By	U272
Wool Fast Blue L	I	U693
Wool Fast Orange G	B	U202
Wool Fast Yellow G	B	U203
Wool Fast Yellow 5 GX	B	U204
Wool Fast Yellow WG	B	U205
Wool Green (V. M.)	K	U395

Name	Manufacturer	Serial No.
Wool Green	tM	566a
Wool Green B	Q	566
Wool Green BS	By,BK	566
Wool Green S	Var	566
Wool Green SAK, 16437	I	566a
Wool Green SC	G	566
Wool Jet Black 3 B	A	220c
Wool Red	K	168b
Wool Red (V. M.)	C	236
Wool Red C	S	236b
Wool Red CS	K	168b
Wool Red G	B	A140
Wool Red K 10 BX	B	A141
Wool Red L, MC, SOC	K	168b
Wool Red SB	CG	64
Wool Red 7742	BK	168b
Wool Scarlet	K	U396
Wool Scarlet (V. M.)	Lev	80b
Wool Scarlet 5 B	H	80c
Wool Scarlet R	Sch	80
Wool Scarlet RR	B	A142
Wool Scarlet 4 R	BK	80a
Wool Scarlet 3 RB	B	A143
Wool Violet B	Q	59a
Wool Violet R	K	U397
Wool Violet S	B	59
Wool Violet SL	K	U398
Wool Yellow	Sch	23
Wool Yellow AT, D, G	K	U399
Wool Yellow LDV, R	K	U399
Wool Yellow S	G	143
Wool Yellow T	G	23
Wool Yellow 1501	K	U399
Xanthine CJB	I	606
Xanthine I	P	606
XL Acid Eosine5 B	H	590a
XL Blue	H	U770
XL Blue GR	H	U770
XL Brown RH	H	284a
XL Green Y	H	U771
XL Maroon	H	U772
Xylene Blue AS, ASL, BS	S	508
Xylene Blue VS	S	507
Xylene Fast Green B	S	564
Xylene Light Yellow	Var	22
Xylene Light Yellow 2 G	K, S	22
Xylene Light Yellow R	K	22
Xylene Light Yellow R	S	22
Xylene Red B	S	579
Xylene Yellow	...	22
Xylene Yellow 3 G	K	22
Xylidine Orange RR	BK,tM	79
Xylidine Scarlet	Sch	82
Yellow (V. M.)	CJ	U500
Yellow (V. M.)	I	141d
Yellow CP	Lev	142a
Yellow FY	H	U773
Yellow NF	BK	U487
Yellow NF	Q	U817
Yellow PC	DH	U601
Yellow R	W	141d
Yellow 2 S	P	137
Yellow (for feathers)	WD	U549
Yellow Black M	BK	U488
Yellow Fast-To-Soap	P	203
Yellow Fat Color	B	68
Yellow Green 6 B	BK	U489
Zambesi Black B	A	A46
Zambesi Black 2 BA	A	A47
Zambesi Black BH	A	A48
Zambesi Black BR	A	A49
Zambesi Black OTA	A	A53
Zambesi Black D	A	A50
Zambesi Black F	A	A51
Zambesi Black OBA	A	A54
Zambesi Black R	A	A52
Zambesi Black V	A	A55
Zambesi Black VM	A	A56
Zambesi Bordeaux 7 B	A	A57
Zambesi Brown	...	330
Zambesi Brown G, 2 G	A	330
Zambesi Brown 4 R	A	330a
Zambesi Pure Blue 4 B	A	274b
Zambesi Red B	A	A58
Zambesi Red 4 B	A	A59
Zambesi Red 6 B	A	A60
Zambesi Red 8 B	A	A61
Zambesi Rubine B	A	A62
Zambesi Scarlet 6 B	A	A63
Zambesi Scarlet 2 BL	A	A64
Zambesi Scarlet FR	A	A65
Zambesi Scarlet PR	A	A66

PAGE INDEX OF SCHULTZ NUMBERS FOR DYES

As the *Glossary of Dye Names* refers only to Schultz numbers, by looking in this index for the Schultz number, there can be found the pages on which any dye is tabulated.

This procedure was adopted for the reason that a given dye, characterized by a Schultz number, will be known under very many names. Such names are listed in the Glossary but could not all be placed in the tables without unnecessarily enlarging this book.

Schultz Number	*Page*
1	509
2	362, 447
3	223
4	526
5	460
6	360
7	360
8	456
9	452
10	253, 260, 452
11	260, 453, 509
12	91, 253, 260, 453
13	260, 453, 471
14	78, 453
15	126, 453
16	183, 453
17	183, 453
18	183, 253, 260, 496
19	21, 91, 345, 481
20	91, 481, 534
21	343, 552
22	21, 213, 529
23	230, 482, 529
24	87, 343
25	21, 496
26	343, 496
27	21, 345, 482, 496
28	343, 533
29	67, 343
30	*Not classified*
31	32, 91
32	91, 238
33	91, 465
34	92, 566
35	92, 509
36	92, 362
37	92, 526
38	92, 286
39	92, 504
40	92, 174
41	92, 298
42	22, 93
43	93, 326
44	93, 508
45	93, 311
46	362, 421
47	421, 504
48	421, 519
49	421, 517
50	279, 422
51	183, 422
52	353, 422
53	330, 422
54	394, 422
55	409, 422
56	362, 377, 422
57	174, 423
58	93, 423, 519
59	219, 248
60	83, 509
61	26, 174, 423, 471
62	245, 500
63	225, 245, 423
64	26, 370
65	26, 504
66	22, 27
67	27, 174
68	36, 554
69	554, 567
70	526, 553
71	225, 553
72	362, 456
73	362, 455
74	42, 43, 362
75	42, 43, 509
76	362, 576
77	414, 576
78	375, 576
79	526, 577
80	372, 577
81	370, 578
82	505, 577, 578
83	498, 505
84	78, 500
85	76, 484
86	50, 362
87	*Not classified*
88	465, 494
89	465, 494
90	78, 494
91	353, 494
92	60, 494
93	108, 362
94	108, 414
95	108, 372
96	49, 108, 519
97	156, 363
98	363, 425
99	363, 426
100	49, 371
101	49, 505
102	126, 519
103	126, 519
104	142, 414
105	360, 385
106	363, 385
107	385, 447
108	375, 385
109	370, 385
110	372, 385
111	385, 526
112	385, 505
113	287, 385
114	174, 385
115	363, 392
116	392, 447
117	182, 371
118	182, 225, 372
119	165, 182
120	84, 185
121	185, 371
122	185, 287
123	186, 526
124	93, 238, 555, 569
125	93, 460, 555, 569
126	93, 363, 555, 569
127	93, 555, 570
128	94, 555, 570
129	38, 174
130	38, 43, 174, 277
131	46, 363
132	74, 363
133	74, 519
134	262, 334
135	262, 334
136	262, 334
137	32
138	238, 529
139	262, 529
140	262, 529
141	262, 529
142	262, 530
143	510, 530
144	360, 530
145	363, 530
146	225, 530
147	225, 530
148	75, 364
149	36
150	87, 262
151	87, 364
152	87, 311
153	46, 364
154	81, 466
155	81, 510
156	81, 364
157	81, 223
158	80, 500
159	77, 364

INDEX OF SCHULTZ NUMBERS FOR DYES

354,
167 180, 354
168 355, 505
169 287, 355
170 355, 380
171 174, 355
172 153, 360
173 364, 403
174 153, 365
175 365, 404
176 153, 414
177 153, 178, 519
178 55, 520
179 311, 403
180 68, 360
181 68, 365
182 94, 125, 298, 552
183 76, 360
184 76, 365
185 72, 365
186 276, 298
187 63, 299
188 299, 484
189 299, 572
190 183, 466, 496
191 437, 496
192 473, 496
193 183, 365
194 184, 414
195 414, 496
196 184, 527
197 496, 527
198 184, 497
199 184, 497, 520
200 110, 365
201 110, 527
202 110, 505
203 40, 262
204 40, 520
205 454, 460, 471
206 243, 454, 471
207 454, 471, 475
208 466, 471
209 184, 355, 466, 497
210 334, 473, 497
211 510, 530, 578
212 361, 531
213 355, 510
214 361, 579
215 94, 326, 423
216 65, 94, 423
217 94, 299, 423
218 71, 207, 386, 424
219 94, 326, 494
220 70, 386, 531
221 424, 520, 531
222 83, 421, 510
223 32, 365
224 32, 414
225 32, 370
226 32, 372
227 33, 287
228 33, 380
229 33, 226
230 36, 153
231 36, 276
232 36, 366
233 36, 414
234 36, 527
235 36, 372
236 36, 505
237 37, 527

Schultz Number *Page*
238 37, 506
239 27, 47, 242, 366, 466
240 83, 366, 553
241 94, 295, 386
242 94, 226, 400
243 27, 386, 527
244 27, 386, 506
245 295, 386, 424
246 34, 366
247 34, 366
248 34, 527
249 34, 180
250 34, 520
251 34, 180
252 37, 366
253 37, 414
254 37, 527
255 37, 180
256 334, 386, 485
257 334, 386, 400, 485, 572
258 334, 386, 401
259 108, 180, 531
260 48, 366, 531
261 299, 386, 531
262 226, 387, 531
263 39, 387, 483
264 299, 355, 366
265 330, 387, 401, 485
266 285, 387
267 264, 264, 285, 387, 387, 394
268 67, 387, 394
269 387, 394, 506
270 55, 94, 287, 506
271 55, 67, 367
272 55, 388, 506
273 23, 388, 411, 527
274 23, 295, 388, 411
275 85, 376, 388, 415
276 85, 226, 388
277 85, 401
278 388, 401
279 33, 95, 325, 486
280 535, 556
281 392, 535, 556
282 392, 535
283 466
284 567
285 200, 466
286 200, 437
287 200, 392
288 198, 367
289 198, 367, 527
290 27, 388, 415, 471
291 415, 471, 520
292 175, 472, 520
293 527, 541
294 520, 541
295 194, 295, 567
296 27, 486, 520
297 194, 295
298 193, 506
299 196, 506
300 196, 506
301 199, 392
302 153, 199
303 199, 460
304 199, 460
305 199, 520
306 126, 437, 473
307 126, 355
308 126, 330
309 126, 356, 413
310 126, 413
311 126, 177, 356
312 126, 356, 415
313 127, 180, 356
314 84, 127, 437

Schultz Number *Page*
315 84, 127, 460
316 84, 127, 154
317 127, 510
318 127, 367
319 127, 287, 460
320 127, 180
321 127, 180, 372
322 84, 127, 367, 379
323 128, 175
324 70, 128, 180
325 70, 128, 371
326 128, 325
327 128, 295
328 128, 295
329 128, 295, 466
330 128, 295, 412
331 128, 295, 447
332 84, 128, 295
333 128, 296, 299
334 129, 273, 300
335 129, 296, 326
336 70, 129, 300
337 129, 300
338 129, 326, 546
339 82, 129, 520
340 129, 129, 356, 405, 521, 521
341 129, 506, 521
342 130, 521
343 130, 296, 521
344 130, 296, 521
345 69, 130, 521
346 130, 325, 521
347 130, 341, 522
348 130, 243, 522
349 130, 475, 522
350 130, 184, 522
351 130, 178
352 131, 228, 567
353 131, 228, 300
354 131, 228
355 415, 432, 522
356 210, 356
357 154, 210
358 84, 210
359 84, 137
360 135, 437
361 136, 483
362 201, 546
363 356, 546
364 330, 546
365 154, 546
366 154, 405, 546
367 405, 547
368 154, 356, 547
369 84, 357, 547
370 84, 154, 547
371 276, 405, 547
372 276, 547
373 84, 460, 547
374 357, 510, 547
375 357, 415, 547
376 510, 547
377 415, 547
378 367, 379, 547
379 175, 415, 548
380 175, 548
381 300, 309, 548
382 300, 388, 548
383 300, 392, 548
384 70, 181, 548
385 325, 415, 548
386 300, 416, 548
387 70, 371, 548
388 70, 548
389 65, 549
390 70, 300, 549
391 301, 549

Schultz Number	*Page*
392	178, 201, 549
393	243, 522, 549
394	522, 549
395	178, 549
396	227, 416, 549
397	228, 416, 549
398	229, 549
399	227, 296, 550
400	367, 551
401	268, 416
402	268, 296, 373
403	268, 296
404	268, 461, 522
405	202, 357
406	202, 367, 399
407	202, 357, 416
408	202, 202, 202, 368, 421, 424
409	202, 368, 379
410	202, 416
411	202, 376
412	202, 416, 506
413	202, 224, 567
414	203, 224, 507
415	175, 203
416	203, 226
417	166, 166, 203
418	165, 203
419	64, 203, 368
420	70, 181, 203
421	69, 203, 416
422	64, 70, 203
423	71, 204
424	64, 204
425	71, 204, 301
426	204, 301
427	204, 227, 416
428	204, 229, 416
429	204, 227, 507
430	204, 227, 301
431	408, 461
432	389, 408
433	392, 410, 507
434	368, 410, 507
435	41, 83, 95, 389, 467, 510, 554
436	296, 401, 467, 472
437	296, 467, 472, 511
438	131, 301, 479
439	49, 131, 301
440	49, 131, 297
441	131, 301, 389
442	131, 297, 389, 508
443	131, 301, 389, 508
444	95, 131, 297, 522
445	95, 131, 475, 522
446	132, 301, 389, 522
447	132, 389, 417, 523
448	132, 302, 467, 523
449	132, 467, 508, 523
450	389, 417, 550
451	371, 390, 550
452	226, 390, 550
453	508, 550, 567
454	467, 508, 523, 550
455	204, 508, 567
456	205, 371, 390
457	205, 467, 508, 523
458	74, 401, 410, 468, 474, 567
459	135, 390, 417
460	135, 226, 390
461	297, 410, 468, 511, 568
462	95, 132, 302, 468
463	95, 132, 302, 568
464	95, 132, 302, 461
465	71, 95, 132, 523
466	65, 133, 523, 531
467	133, 167, 302, 461
468	133, 167, 302, 523
469	133, 207, 302, 468
470	133, 207, 302, 461
471	133, 207, 303
472	133, 207, 297, 303
473	133, 297, 303, 424
474	133, 303, 424. 461
475	134, 303, 424, 523
476	134, 468, 524, 531
477	134, 511, 524, 532
478	71, 134, 524 532
479	134, 175, 357, 468
480	134, 330, 511, 524
481	82, 357, 511, 550
482	96, 524, 556, 560
483	190, 417
484	190, 417, 507
485	469, 532
486	40, 469
487	357, 469
488	200, 357, 469
489	134, 511, 532
490	134, 358, 469
491	137, 297, 469
492	85, 399, 469
493	233, 238, 327, 540
494	242, 345
495	120, 238
496	159, 238
497	209, 238
498	304, 452, 537
499	120, 217
500	159, 282
501	209, 345
502	120, 279
503	159, 279
504	121, 147
505	121, 144
506	122, 144, 279
507	217, 337
508	144, 337
509	138, 304
510	86, 239, 428, 524
511	89, 96, 193, 429, 430, 560, 574
512	96, 430, 556, 560
513	90, 195, 451, 556
514	96, 556, 561
515	239, 461
516	239, 304, 327, 487
517	143, 239, 462
518	217, 487, 537, 538
519	239, 462
520	97, 138, 561
521	97, 138, 557, 561
522	327, 342
523	143, 240, 428
524	97, 557, 561
525	97, 557, 561
526	97, 557, 561
527	147, 328
528	146, 304
529	232, 279
530	218, 279
531	205, 539
532	339, 537
533	232, 339
534	214, 339
535	97, 562
536	98, 557, 562
537	98, 558, 562
538	98, 263, 558, 562
539	98, 558, 562
540	99, 193, 558, 562
541	99, 393, 558, 562
542	163, 254, 305, 334
543	218, 308, 428
544	218, 308, 428
545	145, 308, 428
546	282, 308
547	235, 339
548	270, 328
549	305, 525
550	85, 305
551	159, 178
552	168, 178
553	122, 179
554	159, 179
555	462
556	462
557	525
558	276, 305, 328
559	305, 328, 483
560	537, 571
561	328, 343
562	305, 398
563	305, 330, 358
564	232, 240, 305, 347, 349, 575
565	264
566	287, 306, 328, 368
567	306, 310
568	237
569	237
570	216, 237, 516
571	271, 488
572	99, 216, 488
573	216, 488, 511
574	216, 488
575	234, 516
576	48, 234
577	234, 271
578	234, 511
579	122, 216
580	99, 488, 512, 563
581	216, 489
582	489, 512, 558
583	333, 489, 512
584	211, 459, 512
585	489, 512
586	143, 489, 512
587	489, 512
588	490, 513
589	490, 513
590	490, 513
591	490, 513
592	490, 513
593	211, 513
594	212, 514
595	212, 514
596	514, 536
597	514, 536
598	514, 536
599	290, 490, 500
600	491, 514
601	290, 491, 500
602	568
603	244, 540
604	121, 244
605	121, 568
606	99, 558, 563
607	328, 470
608	*Not classified*
609	*Not classified*
610	139, 324, 502
611	331, 503
612	491, 502
613	491, 502
614	182
615	497
616	497, 563
617	184
618	182
619	245, 361, 440
620	214, 440

Schultz Number	*Page*
621	236, 472
622	100, 290, 440
623	440, 501
624	290, 440
625	290, 447
626	290, 440
627	245, 288, 440
628	231, 291, 441
629	291, 441
630	100, 288, 441
631	291, 441
632	291, 441
633	291, 441
634	291, 441
635	291, 441
636	294, 441
637	288, 442
638	288, 442
639	289, 439, 442
640	100, 291, 442
641	213, 288, 439
642	292, 442, 514
643	292, 442, 515
644	292, 442, 515
645	292, 442, 528
646	100, 213, 288, 439
647	442, 515
648	449, 515
649	368, 443
650	368, 443
651	369, 443
652	306, 369, 443
653	215, 390
654	147, 215
655	223, 443
656	68, 383
657	72, 383
658	309, 443
659	240, 245, 443
660	240, 245, 443
661	240, 245, 247, 275, 444
662	279, 280
663	282, 284
664	247, 292
665	247, 248
666	221, 382
667	247, 281, 381, 382
668	52, 458
669	246, 470
670	246, 444, 568
671	283, 390
672	100, 390
673	100, 390
674	101, 391
675	101, 448
676	444, 484
677	265, 444
678	219, 444
679	101, 559, 570
680	101, 246
681	246, 444
682	101, 444
683	101, 246, 333, 559, 563
684	101, 148, 278, 283, 345 444, 445, 446, 446, 486, 486, 486
685	444, 577
686	101, 218, 220, 563
687	53, 102, 559
688	102, 553
689	264, 444
690	246, 267
691	266, 445
692	248, 445
693	102, 391, 462, 483
694	35, 391
695	35, 472
696	33, 102
697	33, 102
698	102, 431, 435
699	33, 102
700	103, 431, 435
701	33, 472
702	103, 472, 559, 563
703	445, 559, 563
704	445, 559
705	445, 559, 564
706	*Not classified*
707	*Not classified*
708	*Not classified*
709	79, 437
710	568
711	568
712	135, 571
713	472
714	27, 135, 472
715	27, 187
716	571
717	79
718	431, 462, 472
719	103, 424, 436
720	259
721	259
722	259
723	259
724	79, 162, 255
725	79, 162, 252, 255
726	57, 79, 162, 255
727	52, 162, 473
728	235
729	103, 246
730	57
731	246, 361
732	56, 197, 463
733	79, 559
734	79, 432
735	464, 464
736	57
737	433
738	162, 254, 255, 335, 532
739	57
740	258
741	258
742	258
743	258
744	*Not classified*
745	257
746	313
747	312
748	155, 449
749	250, 251
750	258
751	*Not classified*
752	*Not classified*
753	*Not classified*
754	*Not classified*
755	*Not classified*
756	*Not classified*
757	*Not classified*
758	347, 384, 491
759	337
760	241
761	241
762	241
763	118, 124
764	118, 124
765	118, 124
766	160
767	160
768	160
769	500
770	138, 139, 500
771	517
772	293
773	21, 222, 500
774	256, 352
775	256, 352, 463
776	256
777	175
778	25, 115
779	25, 115, 419
780	25, 115
781	25, 115
782	138, 293, 491
783	25, 115, 499
784	114
785	113
786	113
787	25, 115
788	25, 115
789	257
790	109, 250
791	109
792	337
793	338
794	338
795	337
796	109, 249
797	25, 28, 115, 420
798	25, 115, 418
799	25, 115
800	251
801	250
802	250
803	28, 419
804	28, 419
805	28, 420, 431
806	434
807	434
808	28, 419
809	28, 419
810	30, 487
811	30
812	20, 186
813	20, 186
814	29, 140
815	59, 140
816	141, 188
817	141, 188
818	55, 141
819	141, 188
820	190
821	141, 190
822	141, 573
823	89, 141
824	29, 157
825	30, 152
826	29, 208
827	45, 209
828	157, 188
829	59, 208
830	29, 209
831	158, 393
832	111, 208
833	41, 139
834	29, 157
835	116
836	116, 189
837	30, 316
838	30, 316
839	151
840	316, 317
841	316
842	316
843	317
844	44
845	189
846	30, 124
847	191
848	189
849	31
850	317
851	31, 103
852	88, 502, 502, 564

Schultz Number	*Page*
853	251, 564
854	25, 115, 564
855	50, 564
856	151, 564
857	103, 250
858	117
859	45, 564
860	45, 564
861	104, 535
862	25, 104, 115, 499
863	112
864	104, 427, 564
865	88, 503, 503, 565
866	335
867	31
868	60
869	332
870	29, 141, 157
871	*Not classified*
872	118
873	149, 188
874	104, 318, 476, 478, 491, 542
875	429
876	104, 318, 476, 479, 492, 542
877	105, 318, 476, 479, 492, 542
878	105, 318, 476, 479, 492, 543
879	105, 319, 476, 479, 492, 543
880	105, 319, 476, 479, 492, 543
881	105, 319, 477, 479, 492, 543
882	105, 319, 477, 480, 492, 543
883	105, 319, 477, 480, 492, 543
884	105, 319, 477, 480, 493, 543
885	105, 319, 477, 480, 493, 543
886	106, 319, 477, 480, 493, 544
887	168
888	450, 559
889	106, 142, 319, 477, 480, 493, 544
890	106, 142, 319, 478, 481, 493, 544
891	359
892	359
893	117, 206
894	306, 322
895	206, 361
896	307, 322
897	320, 320, 321
898	321, 341
899	314, 322
900	314, 322, 322
901	314, 322
902	58, 323
903	58, 323
904	58, 321
905	314, 321
906	314, 321
907	19, 314
908	19, 314
999	172
910	150
911	19, 58
912	314, 545
913	269
914	58
015	269
916	274
917	171
918	173
919	314, 545
920	164
921	170, 438
922	53, 106
923	78, 79, 192, 473

LANE MEDICAL LIBRARY

To avoid fine, this book should be returned on
or before the date last stamped below.

[illegible] 5 2[illegible]

AUG 23 1932

APR [illegible]

C441
S56
1922

Shreve, R.N.
Dyes classified
intermediates.

67

NAME	DATE DU
E.M. Butt	
Dr. E.M. Butt	MAR 23 '29 NOV 23 1929
W E Bowley	SEP 24 1932
	JUL -5 1932
M J Howard	JAN 20 1937
	APR 29 1941

67903